In This Issue—*Automotive Equipment Show*

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MOTOR AGE

Volume XXXVIII
Number 22

PUBLISHED WEEKLY AT THE MALLERS BUILDING
CHICAGO, NOVEMBER 25, 1920

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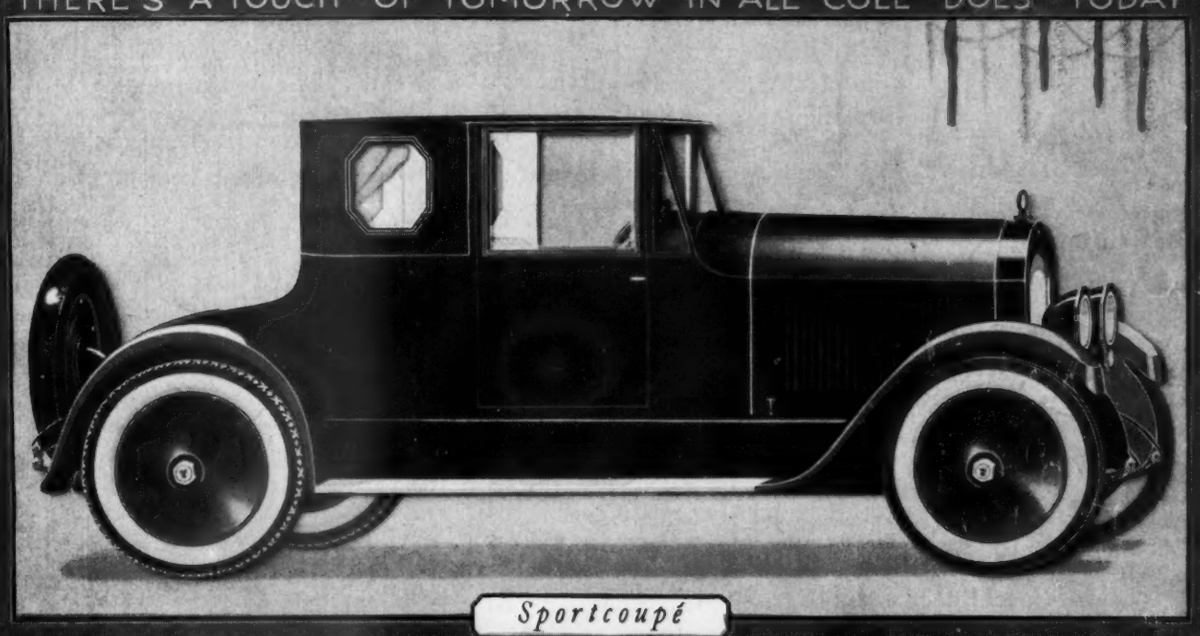
THERE'S A TOUCH OF TOMORROW IN ALL COLE DOES TODAY



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Vol. XXXVIII November 25, 1920 No. 22

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E. E. HAIGHT, Manager
DAVID BEECROFT, Directing Editor
RAY W. SHERMAN, Executive Editor B. M. IKERT, Editor

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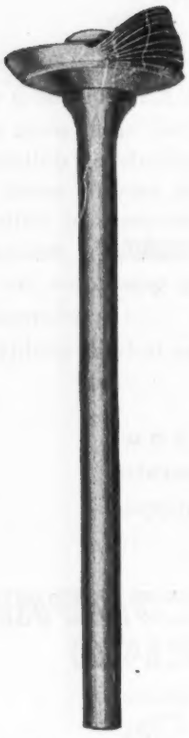

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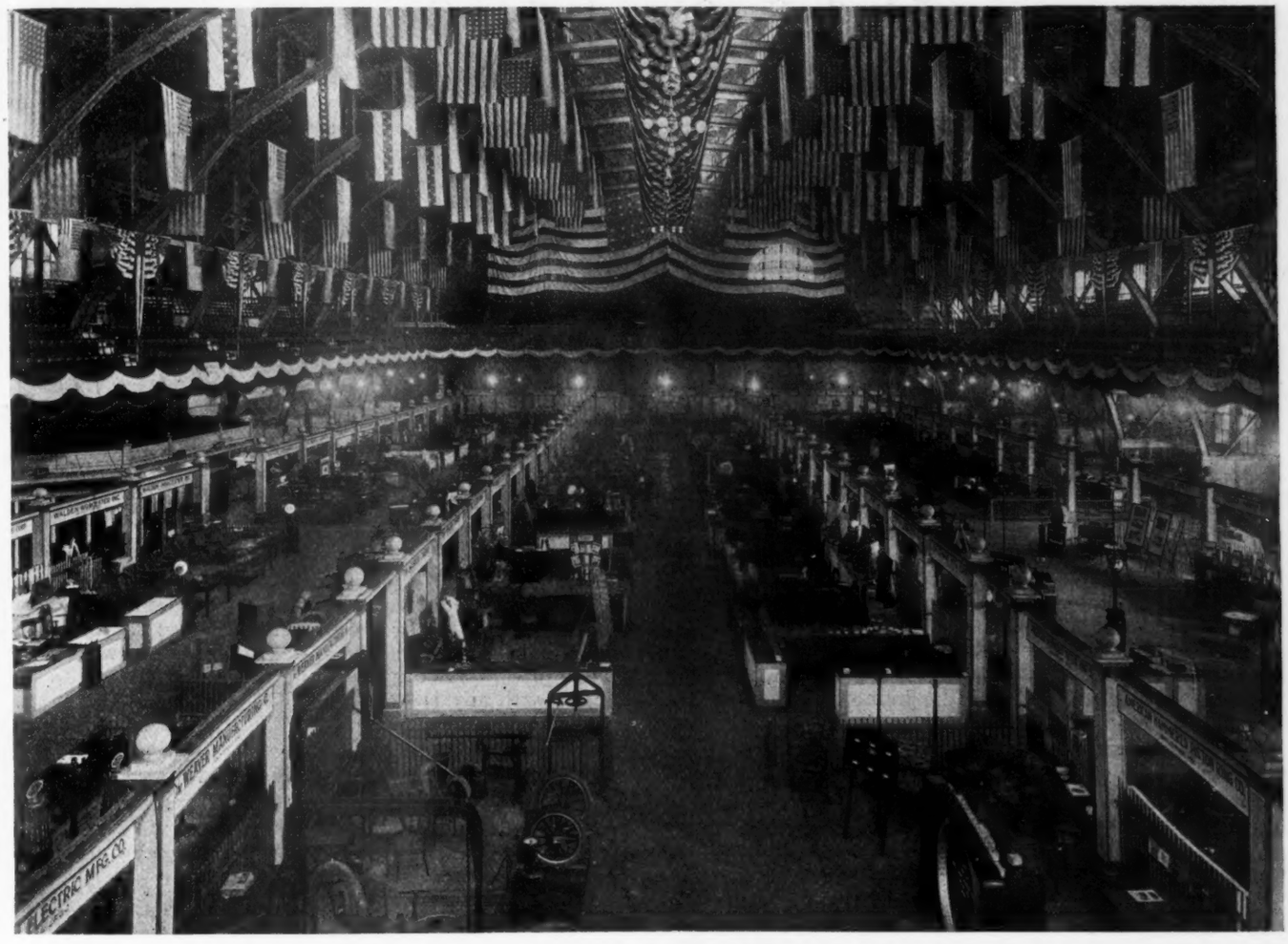

Display of automotive equipment at the Coliseum, Chicago, held in conjunction with the Automotive Equipment Association convention, Nov. 15 to 20, 1920

The Age of Automotive Equipment

SEVERAL years ago when automobile shows made their first appearance it was the usual thing to see displayed along with the cars many accessories like spark plugs, lamps, tire patches and jacks. In those days had any manufacturer thought of exhibiting an electric test bench or a drill press, he probably would have been ruled out.

Today at our national shows, drill presses, burning-in machinery, electric test stands and speed wrenches form a major part of the show. A wonderful line of garage and service station equipment has sprung up as a result of the automotive industry.

We have seen last week in Chicago a show, not for the exhibition of cars or trucks, but for the equipment which either will make them better vehicles or make the job of repairing and maintaining them an easier matter. To the jobber the show meant much. While the jobber is pretty well acquainted with the usual lines of automobile accessories, he is not quite so well informed, perhaps, with the vast possibilities in garage equipment and machinery. The jobber who was there with open eyes certainly must have seen from the nature of the equipment shown that much is being done to put maintenance of automotive vehicles on a production basis.

Jobber Association Becomes

"WHOLESALE ONLY"

Elects Manufacturer as President and Makes Effort to Take the Sag Out of the Sales Curve

CHICAGO, Nov. 19—The Automotive Equipment Association at its annual business exhibit and meeting here this week did three important things:

1—It "went" wholesale only. Hereafter no jobber may become a member unless his business is exclusively wholesale.

2—It chose a manufacturer for president. There was a time when manufacturers were "associate" members, without voting power, and there was feeling between the two divisions. Now a manufacturer has been chosen president by an enthusiastic and unanimous vote.

3—It endeavored to clarify the business atmosphere and start buying by jobbers. As is the case in all lines of trade, there has been a holding off in buying. In jobbing lines it is due to a belief by jobbers that prices may come down. Some have and some haven't.

THE matter of price reductions and buying received considerable attention in the meetings. The jobbers want the manufacturers to do one of two things—cut prices or guarantee them. Some of the manufacturers felt one way and some another, but it is considered probable by the jobbers that the sentiments expressed may lead the majority of manufacturers to take this action soon. It was pointed out by General Manager Alfred Reeves of the N. A. C. C. in an address to the meeting that prompt action by the car makers, in cutting or guaranteeing, had had a salutary effect on the car business by clarifying the sales atmosphere.

At present jobbers' stocks are fairly well down. With most of them business is but 10 to 20 per cent below what it should be for the present period, and some are at normal. There has been a disposition, however, to watch prices and buy cautiously, for none want to be caught with any larger stock than is necessary if prices are likely to decline.

Leading jobbers state, however, that buying must resume soon if there are to be adequate stocks in hand for spring. Several stated that they were not placing orders at the exhibit, preferring to check up after their return home and exercise more deliberation than is possible in the midst of the busy exhibit.

THE jobbers and manufacturers took a whack at pessimism Thursday morning. The question in the commissioner's report, "What is the outlook for business for the next six months?" brought out an expression of confidence on the part of manufacturers and merchandisers that the automotive equipment business is on the threshold of a great year. President Englehart, declaring there was no reason for pessimism, sounded a warning against letting stocks run too low. He said jobbers might better run the slight chance of losses on declining prices of goods in stock than lose their opportunity for profit through failing to carry goods in sufficient quantities to meet the demand.

The convention in the Coliseum annex opened with an attendance of fully 600 jobbers and manufacturers. Alfred Reeves, general manager of the N. A. C. C., was the first speaker. Reeves commented on the readjustment situation and presented figures on the essentiality of the automobile. He saw a great future for the automotive equipment branch of the industry in that fact, as he stated it roughly, that only half the cars in use have all the equipment they should have to operate with full efficiency. Reeves deplored gossip about individual manufacturers or merchandisers, pointing out its depressing influence in times like the present and urging that "if you can't say something good about the industry don't say anything."

United States Senator Medill McCormick of Illinois, who appeared as the principal speaker outside the industry, said he hoped for a readjustment of the government activities and expenditures so that the excess profits tax could be repealed without substituting another burden on industry. He stated his opposition to the proposed merchandise tax and said that if it developed that federal revenues would be insufficient with full repeal of the excess profits tax he would

favor its gradual reduction to the point of elimination.

The credit department, from its establishment July 1, 1916, to Oct. 15 this year, handled 19,840 claims for members, amounting to $703,708, collecting $447,170, a percentage of 63½ percent.

The association approved a recommendation of the directors for appointment of a committee to work for the interests of the organization on federal taxation and other legislative subjects.

Reports by several jobbers that Ford dealers had refused to buy accessories from them as they distributed equipment for Ford cars built outside the Ford factories brought up a discussion as to whether the Ford dealers in this connection were acting on their own initiative. Opinions were varied.

The convention voted to send a questionnaire to all jobber members to determine the average cost of doing business. Some months ago a similar questionnaire sent out by the Eastern Automotive Equipment Association in its territory showed that the average net profit of the jobber on a year's business was 5 per cent.

The Committee on Assisting the Trade, which was inactive last year, was reestablished to take a hand in inducing a more favorable attitude toward the industry on the part of the newspapers and to work generally for better trade conditions.

The manufacturers, in their separate session Thursday afternoon, could not see their way clear to meet the suggestions of the jobbers that prices be guaranteed against decline and that freight charges be absorbed or price differentials established to remove the hardships placed upon jobbers far removed from the centers of manufacture. Few of the manufacturers saw any liklihood of lower prices before May 1, the suggested guarantee date, and practically all who spoke held that as the jobber benefited by the rising market of the past few years so he should stand his share of possible losses resulting from declining prices. The manufacturers felt that the price question should be allowed to follow a natural course to solution, declaring that guaranteeing prices probably would accomplish less in inducing prices than have price reductions in many lines where buying is little if any heavier than at former costs.

DISCOUNTS REMAIN WHERE THEY ARE

The manufacturers asserted the freight rate question was too complicated for adjustment in their offices. They felt that jobbers would have to work out their own problem of estimating increased freight costs under the new rates and passing the charges on to consumers.

The manufacturers answered in the negative the question of the jobbers as to whether lengthening of discounts could be undertaken. This led to a discussion of direct shipments to retailers on jobbers' accounts, a practice which one manufacture said he was trying to discourage by shortening the discount on purchases in this class. He announced a differential of 7 per cent between direct shipments and consignments to the jobber for distribution.

AIRPLANE BUSINESS TOO SMALL FOR JOBBER

The manufacturers declared the airplane business had not yet reached a stage of development to warrant jobbers handling equipment.

While it was not a buying show there was buying. New lines got a good introduction and old lines went home with some business. But in the main, the careful buying of the consumer, passed on to the retailer and so to the wholesaler, a condition that has prevailed for weeks, held force throughout the exhibit.

What happened on the exhibit floor, together with convention developments, strengthened the determination of jobbers, while curtailing expenses in nonproductive lines, to put steam into their selling organizations. Most of them seemed to want to get steam up and see what it did before they signed up for the cargo to hook on behind the engine. This explained the prevalence of blank pages in the manufacturers' order books.

Jobbers who spoke at the convention and who talked over conditions in the hotel lobbies reported generally that business was 10 to 20 per cent below normal. Orders are, however, smaller and more frequent. One manufacturer in one section, for instance, had 300 to 350 invoices a month instead of 175 to 200 in the same time early in the summer for an almost identical volume of business. But jobbers' collections generally are better because the dealer and garageman, carrying light stocks, is getting a rapid turnover. Jobbers' stocks, while not so depleted as to make it impossible to meet customers' demands generally are low and warning was issued officially in the convention against letting them get too low, with resultant loss of profits which may be greater than possible losses on stock should a decline in prices set in.

It was apparent that there must be an early resumption of buying all along the line if the possibility of depleted manufacturers' stocks, as a result of curtailed discontinued production, a situation which would be disastrous to spring business in the repairshop and accessory store, is to be avoided.

There was little promise of any immediate decline in prices, the manufacturers pointing to high raw material costs as an obstacle, while several jobbers urged that the manufacturers find some way to meet the country wide public demand for lower prices on everything. The manufacturers' division declined to attempt stimulation of sales by guaranteeing prices to May 1, not by lengthening wholesale discounts, deciding to stand firm for readjustment along natural lines as controlled by supply and demand.

SUBJECT OF PRICE GUARANTEE RAISES DEBATE

There was quite a tilt between some individuals in the manufacturers' and jobbers' divisions over the price guarantee suggestion. It was precipitated when a manufacturer, commenting on the lack of buying in the show, asked for an expression which would indicate the jobbers' buying policy. A jobber retorted that it had been contained in the recommendation of the board of directors of a price guarantee, "which the manufacturers turned down." Other manufacturers responded that jobbers who had benefited by rising prices in the past few years could hardly expect the producers to bear the entire burden of price reductions now.

NEW MEMBERS

The association elected four jobber members: Clemons Auto Supply Co., Eau Claire, Wis.; Farrar-Brown Co., Inc., Portland, Me.; Hendrie & Bolthoff Mfg. & Supply Co., Denver; Quinn & McGill Motor Supply Co., Denver. Ten manufacturer members were elected: Clayton & Lambert Mfg. Co., Detroit; Crawford Mfg. Co., Richmond, Va.; Cincinnati Ball Crank Co., Cincinnati; Dover Stamping & Mfg. Co., Cambridge, Mass.; Greb Co., Boston; Kennedy Mfg. Co., Van Wert, O.; Miles Mfg. Co., Newton, Ia.; Spencer-Smith Machine Co., Howell, Mich.; Storm Mfg. Co., Minneapolis; Slaymaker Lock Co., Lancaster, Pa.

SOME FELICITATIONS

At the closing session Friday the association gave rising votes of thanks to retiring President Englehart, to Commissioner William W. Webster and to George Fritz, who retires Dec. 1.

The next meeting will be held July 4-11, Mackinac Island, Mich.

1921 Officers of the A. E. A.

President — Robert A. Stranahan, President, Champion Spark Plug Co., Toledo, Ohio.

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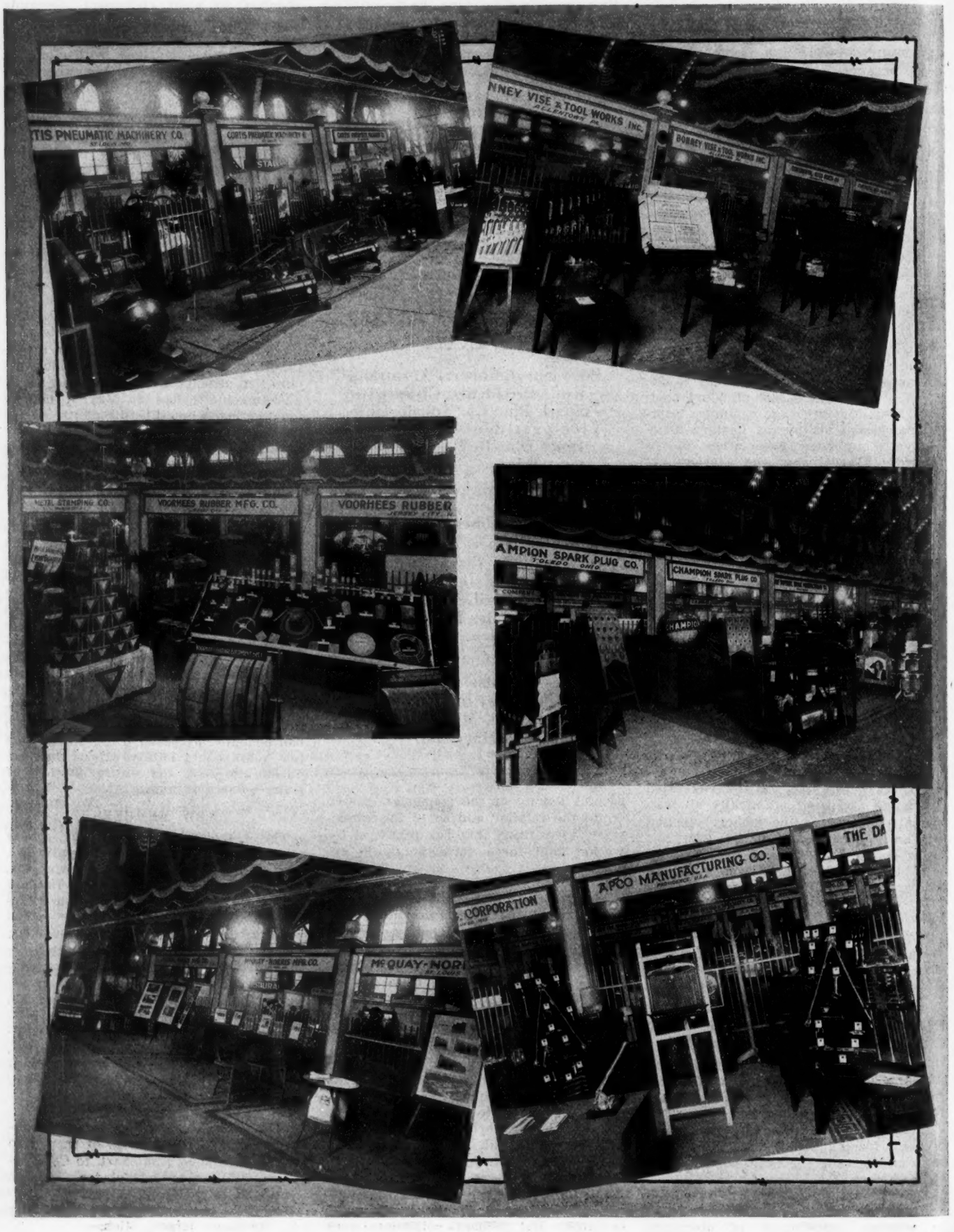
Service Equipment Accorded Its True Dignity and Importance at the Automotive Equipment Show, Chicago



How the Dealer Can Influence TRACTOR DESIGN

THROUGH the efforts and experiments of dealers many valuable suggestions have been passed along to the manufacturers to the end that some of the modernly designed machines intended to work with the tractor have been modified considerably, thus much increasing their usefulness and making them more readily salable. In some instances adaptations have been made through dealer representations which have brought into the market machines which are entirely different in appearance and in application than were their prototypes.

SOME of the best results that have been attained in the tractor and power farm equipment industry have been reached through the co-operation of the dealer with the manufacturer. A few of the most modern of the specialized tractors, that is, tractors that are especially adapted to particular uses, actually have been worked out in the retail field and have been adopted by manufacturers. Likewise, not a few of the instances of coordinated tractors and implements have been similarly developed.

Perhaps the most prolific field for co-operation lies in the development of farm power equipment which is to be used with the tractor. Nothing can be truer than that, no matter how perfectly a machine may be devised, there will be conditions amidst which it will not work to the best advantage unless certain modifications are made in it. These hardly are fundamental and will not much affect the general design and construction of the tool, but in many cases the secondary modifications which clever dealers find it expedient to make in the tools they sell are quite as important as the principles in the original design.

AN instance of the development of a machine entirely different from the original is the combined tractor and spraying machine which now is being built and put on the market by the Bean Spray Pump Co., of San Jose, Cal. This is a Fordson tractor, fitted with an extension frame in front, on which is imposed a spray pump which connects with the spray mixture tank hauled behind the tractor through a flexible tube. Inasmuch as the Fordson tractor very nearly conforms to the structural conditions demanded for orchard tractors, and as spraying is a job which is ubiquitous in California orchards, such a combination machine meets with approbation from the orchardists. It must be apparent that the tank can be disconnected and the tractor used for the regular work of such a machine without interference from the pump which remains on its front.

Worked Out by Fordson Dealer

This combination machine actually was conceived and worked out by the Fordson dealer at Yakima, Wash. Yakima lies in the midst of an orchard area and the majority of the tractor demand in that section comes from the orchardists. Intelligent observation of the possibilities of tractor use in the orchards led the dealer to conceive the idea that if the spraying machine could be combined with the tractor, both for power and propulsion, the demand for both tractors and spraying outfits could be increased.

Experiments therefore were undertaken with the result that a practicable machine was devised, which after examination, the Bean Spray Pump Co. undertook to build. Thus, through the enterprise of a dealer who was looking merely to the advancement of his own trade, there has come to pass the production of a combined machine which seems destined now to be adopted by nearly every Fordson dealer on the Coast and which will meet an obvious need of California orchardists. And it is by no means unlikely that a similar application of the spray pump to the tractor may spread throughout the orchard districts of the whole country since the idea seems to be entirely practicable and as applicable to Eastern orchard conditions as it is to Western.

Attempt Own Design

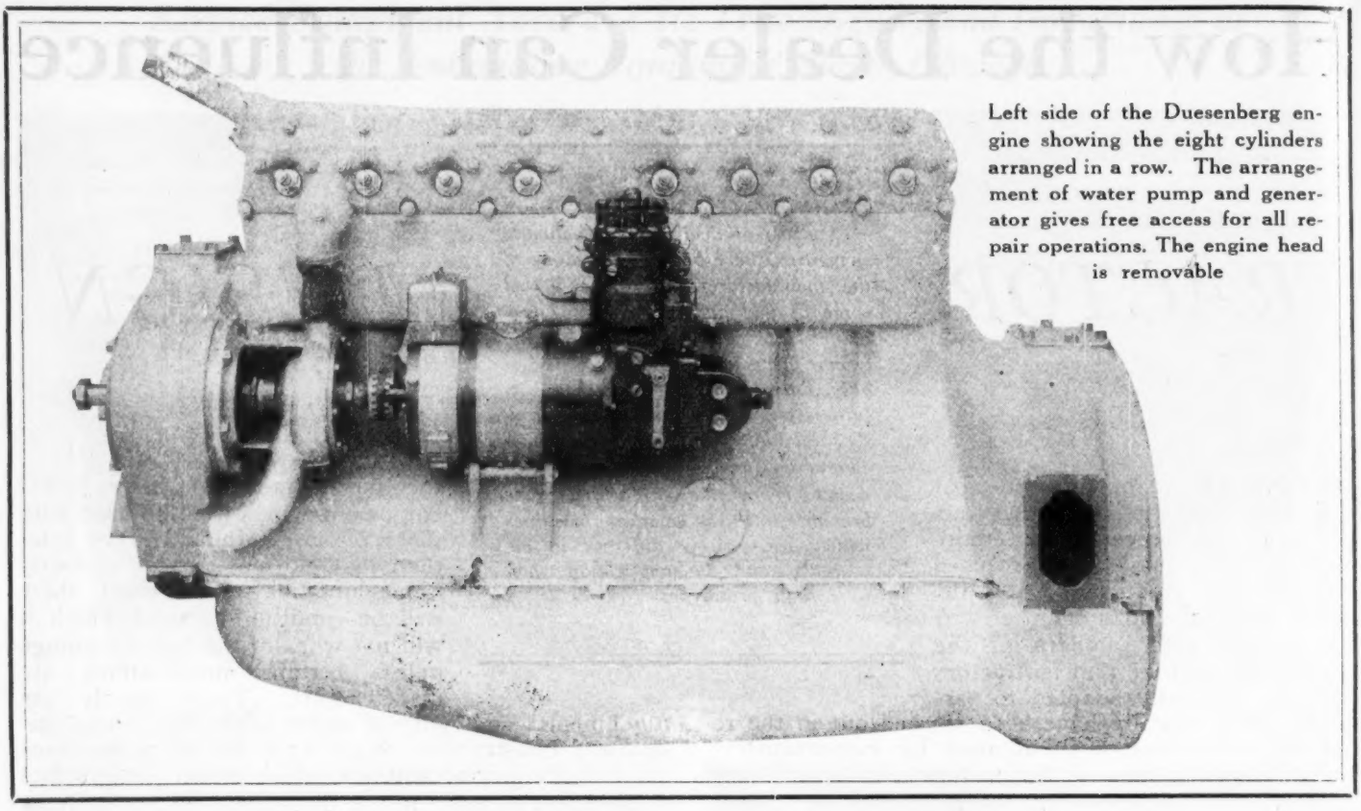
Instances are also numerous of dealers so interesting themselves in the adaptation of their product to local needs that they have, of their own accord and practically at their own expense, attempted the design and introduction of some innovation to make their particular tractor more readily salable in their localities. An instance of this which is typical is afforded by J. Earle Gryder of San Jose, Cal., who is now manufacturing a special drawbar for the Wallis tractor which he was instrumental in introducing into his locality.

Again it was the orchard need which induced the innovation. Inasmuch as a tractor which is to be used in the orchards must have a short turning radius and must answer quickly to the influence of the steering gear, Gryder found it expedient to devise a wheel brake for the Wallis and a flexible drawbar so that after the tractor answered the steering gear it would not interfere with the implement behind the drawbar until the turn was practically completed. In other words, the tractor can be turned at better than right angles to the plow or harrow it is pulling with the Gryder drawbar, while this flexibility in handling could not have been obtained with the rigid hitch with which the tractor comes as regular equipment.

Such a dealer comes the nearest to being what the ideal tractor dealer should be, a man, namely, who thoroughly understands the conditions which prevail in his locality and whose interest lies in meeting those conditions the best. In other words, his interest does not end when a tractor is sold, but he follows the tractor to the farm and the orchard and he sees to it that it is equipped with those things which alone can make it economically valuable to its owner.

Helps Maker Avoid Mistakes

Yet the dealers here and there throughout the country who have interested themselves in the needs of their territory, and who have put their ingenuity to work to plan and devise new machines, new combinations of machine, modifications of existing design and sometimes entirely new additions to standard design, are the ones who are doing more than their share, as dealers go, toward advancing the cause of power farming and it is these men to whom the manufacturer looks to help him keep in touch with demand and to see that he makes no mistakes in so designing his goods that they shall best meet the average need.



Left side of the Duesenberg engine showing the eight cylinders arranged in a row. The arrangement of water pump and generator gives free access for all repair operations. The engine head is removable

DUESENBERG

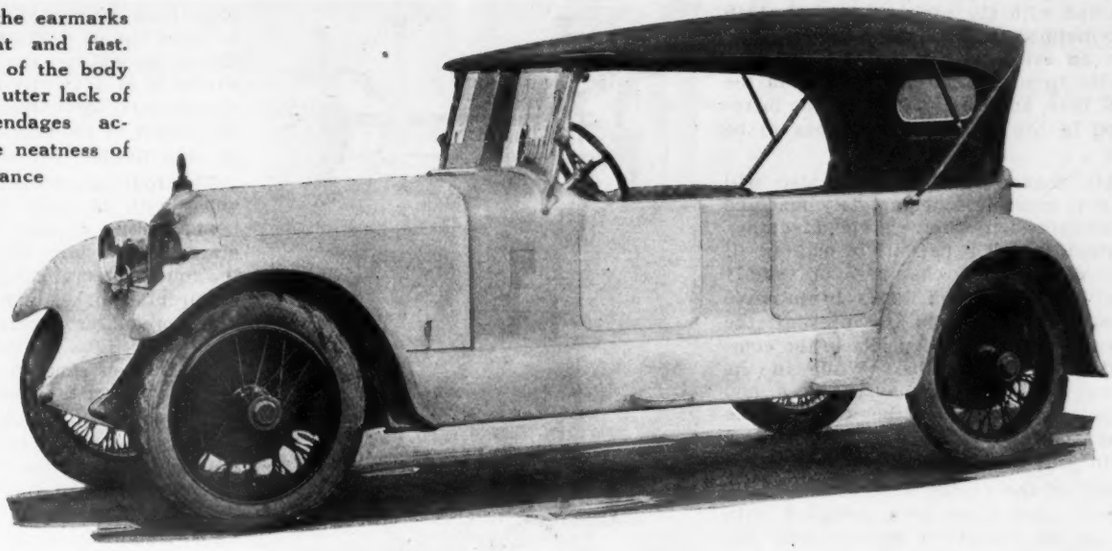
America's First Vertical Eight

Fred S. Duesenberg, Long of Race Car Fame and Builder of the Famous Duesenberg Race Cars, Announces the Vertical Eight Cylinder Passenger Car. Hydraulic Brakes on All Wheels a Feature

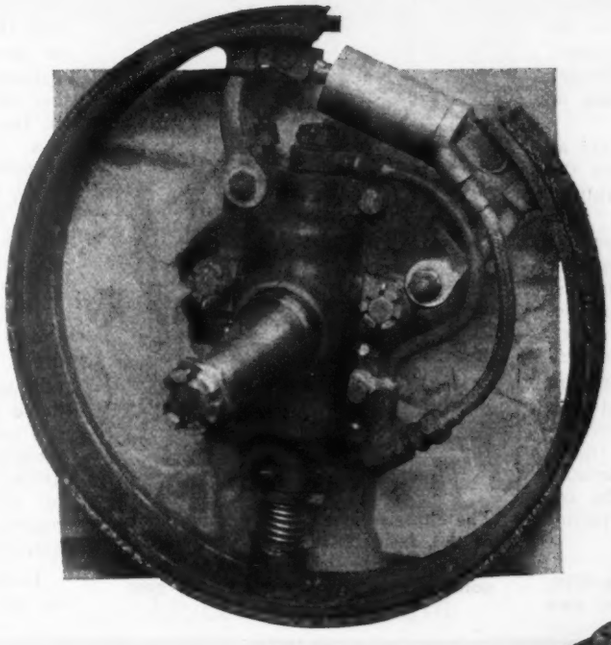
ONE of the most interesting new cars exhibited at the Salon this week is the Duesenberg "straight eight" which has been developed by the Duesenberg brothers at Elizabeth, N. J., and will be manufactured in Indianapolis. Fred Duesenberg with his engineering staff has been working on the design of this car practically since the signing of the Armistice. Many of the features are similar to those of the post-war Duesenberg racing machines, notably the use of an eight cylinder-in-line engine. The success achieved by these racing machines the past year are well known to our readers and need not be recapitulated here.

In the design of the new passenger chassis it has been Mr. Duesenberg's aim to produce a car that should embody the most up-to-date features in passenger car engineering, a car that while having all the liveliness and speed that the fastidious owner demands, would yet be economical to operate. Fuel economy has been achieved by the use of an engine of moderate cylinder displacement (260 cu. in.) and capable of running at very high speed and tire economy by the use of cord tires of liberal size and the reduction of all unsprung weight to a minimum so as to eliminate bouncing of the wheels and consequent slipping and wear of the tires.

THE engine has a bore of 2⅞ in. and a stroke of 5 in. All eight cylinders and the top part of the crankcase are cast in a single block, the cylinder head being a separate iron casting and the lower half of the crankcase an aluminum casting. In the engine shown at the Salon, the well-known Duesenberg arrangement of valves is used, the inlet and exhaust valve being arranged in the cylinder head horizontally and operated by means of rocker levers extending up the side of the cylinders. However, owing to the very satisfactory results



The car has the earmarks of being light and fast. The plainness of the body work and the utter lack of frivolus appendages accounts for the neatness of appearance



Right: The hydraulic brake of the Duesenberg is very ingenious in construction. A master compression cylinder is used which is operated by the foot pedal. The compression of this plunger forces the liquid to the small plungers on each of the four wheels. Here the expansion of the small cylinders causes the brake to bear on the wheel drum, in proportion to the pressure exerted by the driver on the master plunger

Below: The right or carbureter side of the engine is shown at left, and the front view is shown to the right. It will be noted that every moving part is enclosed

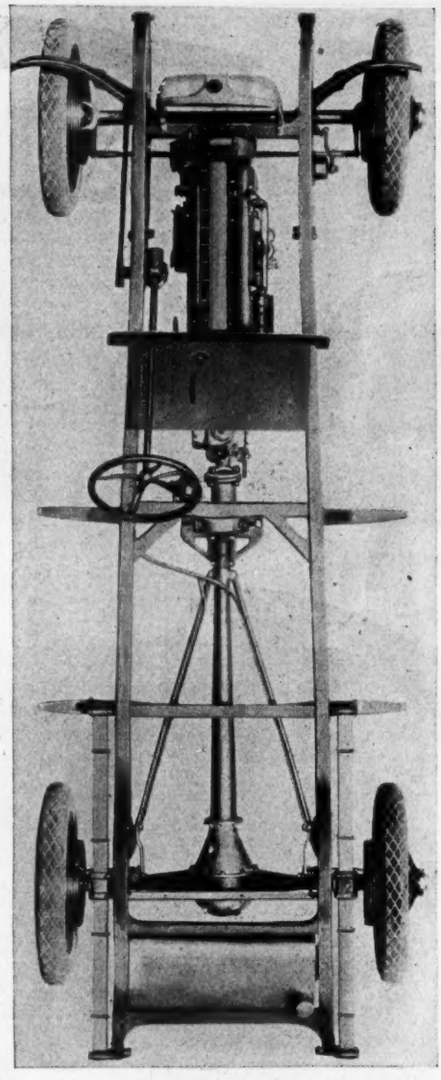
obtained with the racing engines, which have inclined valves in the head, operated from an overhead camshaft, it has been decided to adopt this construction in the stock cars, and this feature will be introduced in the next lot of engines to be built.

This change in the design also will make it possible to completely machine the compression chambers, the advantage of which is that it permits of making all eight compression chambers of exactly equal volume, which tends to promote smooth running, and to prevent the adherence of carbon deposits to the combustion chamber walls. While in the racing engine two exhaust valves and one inlet valve are used per cylinder, the passenger car engine will have only a single inlet and a single exhaust valve.

Most of the racing successes of Duesenberg cars have been achieved with the aid of magnalite pistons, and Mr. Duesenberg still favors aluminum alloy pistons, but in view of a certain amount of prejudice against them, due to the fact that some prominent manufacturers have given up their use, he will furnish either aluminum or cast iron pistons, as desired by the customer.

Piston and connecting rod are held as light as possible, in order to reduce the inertia forces and the stresses resulting therefrom. The pistons are of thin walled design, and the piston head is connected to the skirt by means of four radial ribs, which serve both to support the piston head and to help transmit the heat absorbed by the head to the skirt. Each piston carries only two compression rings, in grooves above the piston bosses, it having been found that two rings, when well fitted, ensure substantially as good a compression as three, and, of course, they save considerable weight. There is a circumferential oil groove cut into the skirt of the piston over the end of the piston bosses.

A crankshaft of the three bearing type is used, consisting substantially of two four-throw cranks joined end to end and at right angles. While not as speedy as the racing engine, the Duesenberg stock engine is of decidedly speedy design and special care, therefore, had to be given to the layout of the crankshaft with a view to eliminating periodic vibration.



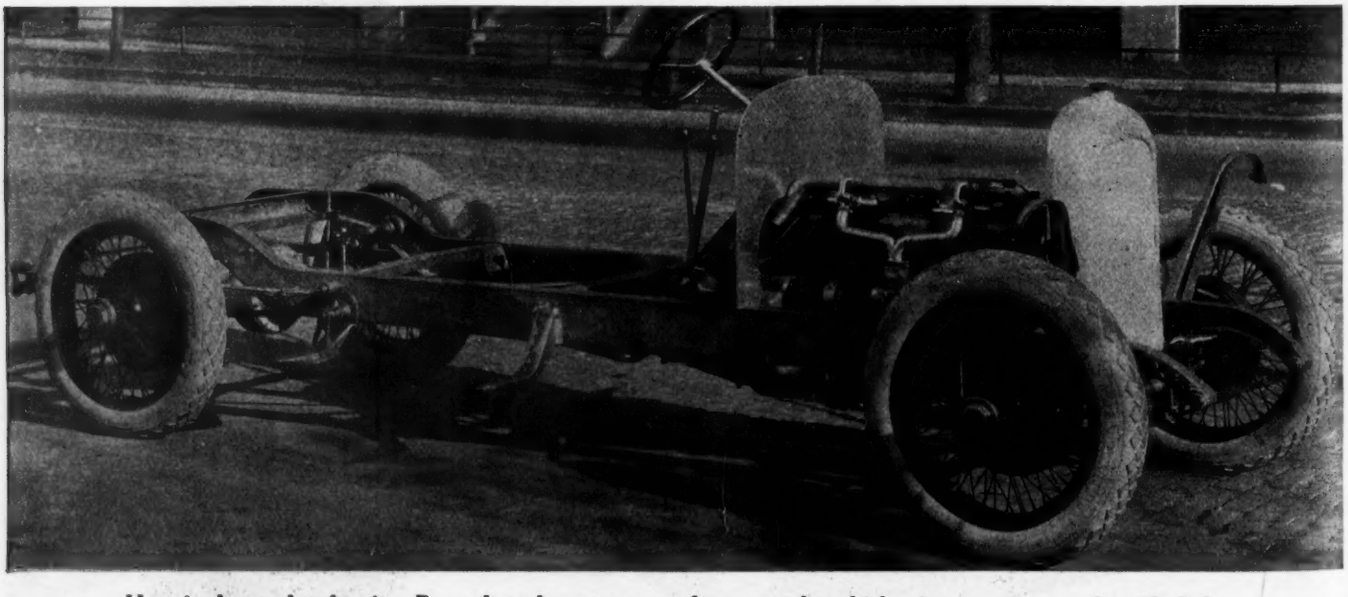
The chassis view shows the simplicity of the design. It will be noted that a torque tube is used, a feature of construction that seems to be gaining favor

The four short crank arms are provided with integral counterweights extending in the opposite direction from the crank axis, while what corresponds to the four long crankarms are in the form of circular disks, and in addition there are two counterweights which are forged integral with the two halves of the crankshaft at their middle point. End thrust is taken up on the central main bearing.

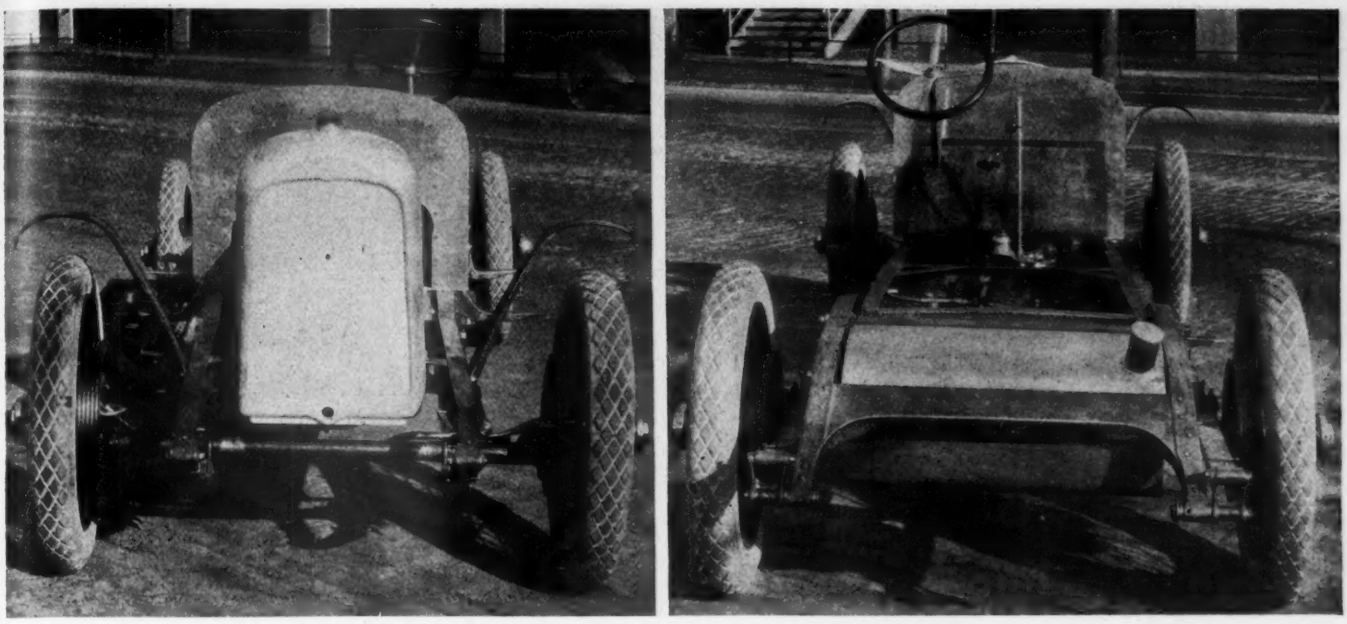
In the new design of engine, the overhead camshaft will be driven through a vertical shaft at the forward end, with helical gears at top and bottom, the vertical shaft running at crankshaft speed. This construction is similar to that employed in the racing engine, except that the latter has straight bevel gears and that both members of the upper set of bevel gears will be mounted in the cylinder head, instead of the driven member in the head and the driving member in the aluminum valve gear drive housing. Thus, when the cylinder head is removed, the two upper bevel gears come right with it, the driving gears slipping over the top end of the vertical shaft, which has one flat on it. This makes it impossible, in taking the engine apart and reassembling it, to get the valve drive together wrong.

As already stated, the entire valve drive at the front end of the engine is encased in an aluminum housing. A drive for the generator is taken off from the vertical shaft at about mid-height by means of a pair of helical gears, and a drive for the combined water pump and oil pump is taken off the crankshaft pinion by means of an extra bevel gear, mounted on a horizontal shaft.

Lubrication of the engine is entirely by the pressure system, the gear type of



Here is shown the chassis. Pressed steel parts are used generously which give great strength with light weight. The step plate hangers are of pressed steel as are the supports for the front fenders



Front and rear views of the Duesenberg further emphasizes the mind of the designer by the simplicity of the layout. The front view shows the tubular front axle. The rear view shows the pressed steel cross member which is also a protection for the gasoline tank

oil pump being located at the forward end of the engine, as just explained. The oil is forced through a passage machined in the housing of the pump into a main distributer pipe extending the length of the crankcase, and through radial passages from same to the three main bearings.

The entire electric system, including the ignition unit, the generator and starter, is of Delco make. In the racing job the distributer was driven by a pair of helical gears off the center of the camshaft, but it has not yet been definitely decided whether on the stock model the distributor will be similarly driven, or whether another location will be chosen.

A feature of the cooling system of the engine fitted to the car exhibited at the Salon deserves mention. Here the water pump is located directly back of the camshaft gear housing and a short hose connection joins its outlet to the water inlet of the cylinder head. The water here enters a passage which extends the whole length of the engine underneath the exhaust valves, and at the rear end of the engine enters the main jacket space. Thus the chief cooling effect is produced where the greatest amount of heat is absorbed by the metal.

In the design of the axle, every endeavor was made to cut out all unnecessary weight so as to get the lightest possible unsprung parts consistent with the strength necessary for safety. Thus the axle shafts are made of chrome nickel steel, and drilled out by means of a gun drill. The outside diameter of these shafts near the hub, is 1 1/32 in. and near the differential 1 7/16 in., while the drill hole through them is 7/8 in. in diameter. The serrated hubs on which the wire wheels are mounted are forged right on to the axle shaft, thus eliminating considerable machine work, obviating risks from joints, and saving weight.

The rear brake drums are secured directly to the axle shafts, without intermediary parts, which is the best way of insuring continued alignment with the shafts.

In the design of the front axle, Mr. Duesenberg has reverted to the tubular type, his reason for this being that the front axle has to sustain the brake reaction of the front brakes, and a tubular section has greater torsional strength than an I section containing an equal amount of material. The tube is of chrome nickel steel, and has a wall thickness of 1/8 in., though in the coming model this may be increased to 5/32 in. The steering knuckles and axle ends are drop forgings and are of somewhat unusual design, partly because the main member of the axle is tubular and partly because provision has to be made for supporting the brakes and conveying the oil to the brake cylinder endowed with a dual motion.

Specifications of the Duesenberg Eight

Engine—8 cyl., bore 2 7/8 in., stroke 5 in.
Lubrication—Pressure system.
Starting and Lighting—Delco.
Wheelbase—134 in.
Body—Aluminum, 4 or 5 passenger capacity.
Weight—3100 lbs.
Tires—Oversize cord, 34 by 4 1/2 in.
Brakes—On all wheels. Hydraulically operated.

The frame is light yet strong, both side and cross members being made of 1/8 in. chrome nickel stock. The side members have a depth over the middle portion of 6 7/16 in. and taper toward the ends. In the model now under development, the flanges of the frame side members will be widened where the cross members come, so as to allow for the metal taken away by the rivet holes at these points. There is one very deep and thoroughly braced cross member at the middle of the frame, to which the forward end of the propeller shaft housing connects.

Then there is the front cross member (which carries both the forward part of the engine and the radiator), one cross member at the forward end of the rear spring, two cross members almost directly over the rear axle, and one cross member at the rear end of the frame.

One of the outstanding features of the chassis is the four wheel service braking system. In our descriptions of French cars, with four wheel brakes, it probably has been noticed that a single actuating mechanism system known as the Perrot, is used almost exclusively. This is undoubtedly due to the difficulty of designing a simple and efficient mechanism for conveying the brake actuating mechanism to the pivoted front wheel brakes. Duesenberg has adopted an hydraulic system of actuation.

These brakes are foot-actuated in accordance with the regular practice, but the motion of the brake pedal, instead of being transmitted to the brake by a direct mechanical linkage, is transmitted by columns of oil under pressure. It may be of interest to point out in this connection that a similar system of transmitting motion was most successfully used in the C. C. or Constantinesco machine gun actuating mechanism during the war. To this end there is provided on the main cross member, at the middle of the chassis, a master cylinder, containing a leather cup type of piston, the

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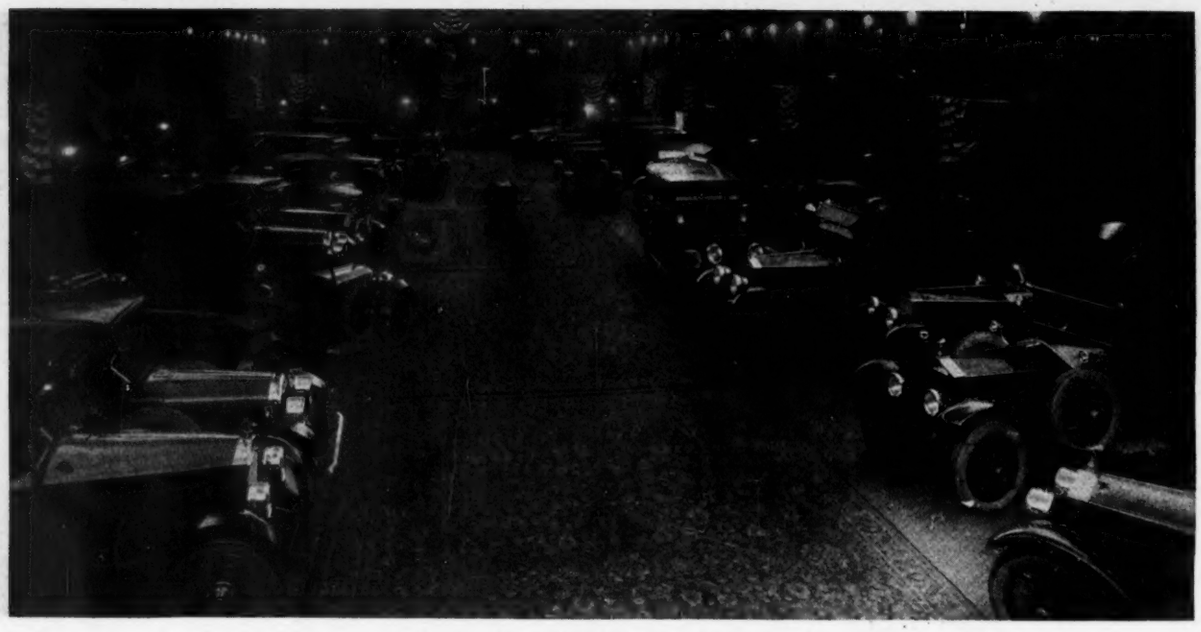


Scene of the Sixteenth Automobile Salon held in the Commodore Hotel, New York

American Cars Outshine Europe's Offering

Display of Quality Cars at Sixteenth Automobile Salon Reflects Great Credit to American Workmanship

NEW YORK, Nov. 17—American quality cars more than hold their own with the Old World's best creations of chassis and coach in the Sixteenth Automobile Salon in the Hotel Commodore this week.

This exclusive collection of motor cars, which started as an exhibition of imported cars before the war, is gradually assuming the character of a distinctly quality show rather than one of foreign designs. The salon, this year, introduces many innovations and refinements in motor car craftsmanship, among which may be noted a particularly fine showing of American workmanship.

Among the outstanding features as displayed in this season's cars are the use of hydraulic brakes on front and rear wheels, several new types of spring suspension and cylinder arrangement.

Beauty of body line and exquisite taste and workmanship in coach building are shown in the exhibits of the custom body builders. There are indications that the streamline body is passing out, and artistic fender designs, radical departures in running board design, as well as mouldings and stripes, growing in favor. Slanting windshields are disclosed as growing strongly in favor among the American builders, although the European models still show several vertical windshields.

Of the twenty cars shown at the Hotel Commodore this week ten are American, and one more American car is expected to make its appearance before the show closes. The custom built automobile body exhibit is all-American, nine firms being represented. The Duesenberg is the only entirely new American car shown. Another new American car, the Collins, is scheduled in the list of exhibitors and is expected to arrive before the show closes.

Of particular interest in considering the foreign cars shown this year is the reappearance of the Minerva, which has not been in the Salon since 1913. The new Minerva is a 4-cylinder product which is to be imported and sold in the United States by the Brooks-Ostruk Co., New York.

Sunbeam shows a car similar in most respects to the one in last winter's Olympia.

A new marine roadster, a four-passenger type with an aluminum body and having a mahogany deck running all around, was a feature of the Daniels display.

Another type of body shown is the suburban sedan, with a landaulet type body. This has doors inlaid with mahogany, windows that can be completely lowered so the top of the glass comes down flush with the sill, and a truck rack at the rear, spare tires being carried forward.

Winton showed a new standard sport model, a 4-passenger job, built on the Winston 33 chassis. There is a storage compartment in the rear of the front seat. Two spare wheels are carried on the sides in front. Disk steel wheels are fitted. The windshield is a one-piece type. The Winston 4-passenger sedan has replaced the rear deck with a trunk carrier.

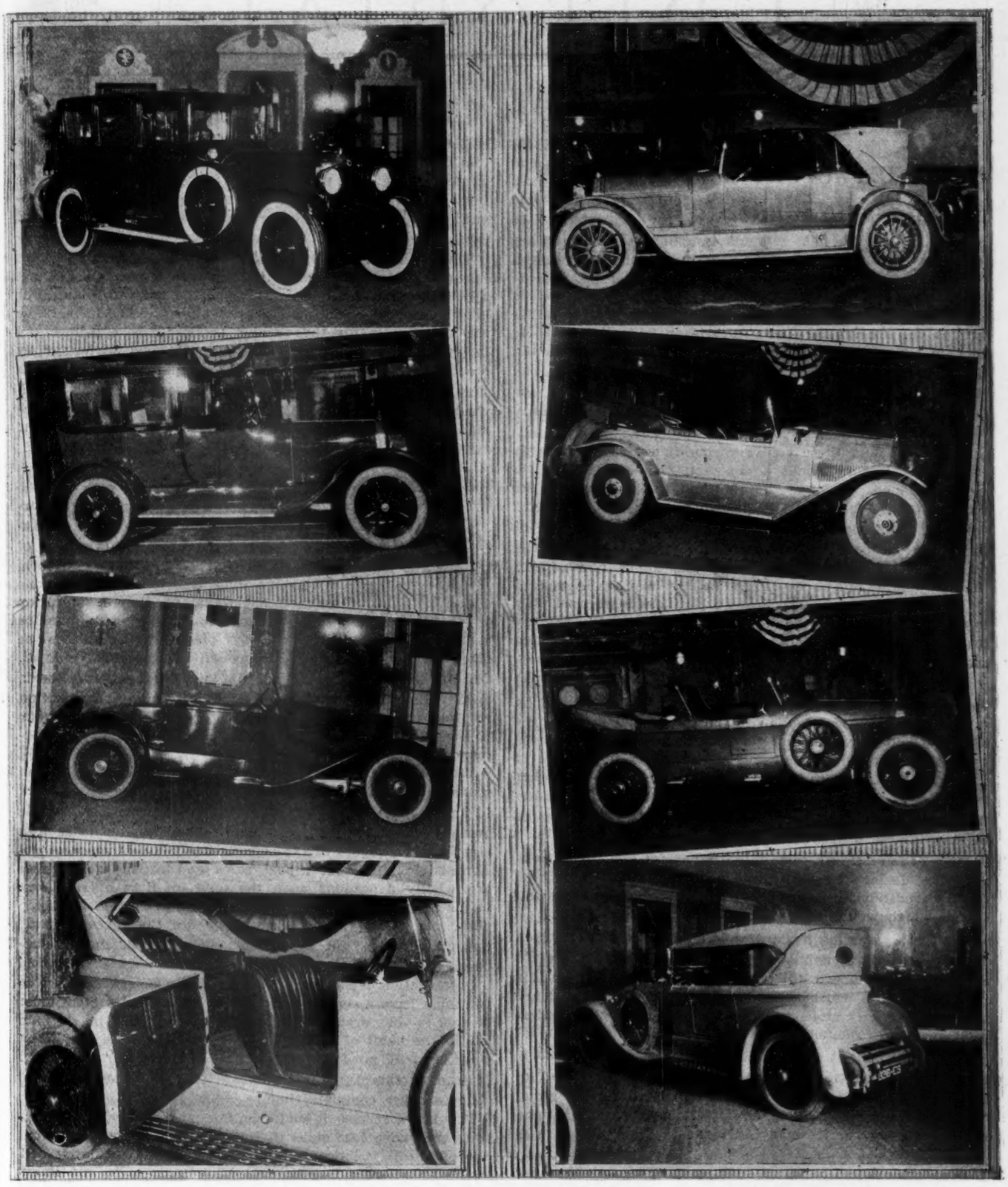
The Cunningham exhibit features a 4-passenger chassis, guaranteed to develop 84 hp. with regular equipment. This is the same chassis as used by Ralph De Palma in speed trials at Sheepshead Bay, in which he broke several world's records.

Brooks-Ostruk shows a sport body designed for four passengers. It has individual front seats which tilt forward to allow of free entrance to the rear seats. Single doors on both sides give entrance to both front and rear seats. The body is of crowned aluminum, the sides being concave toward the outside. The fuel tank at the rear is protected by mahogany slats. A California top is fitted with a single oval glass window in the rear. The running boards are of mahogany with longitudinal slits cut in them in which are inserted wavy metal strips, while corrugated strips are secured to the top of the running board.

Handsome bodies are shown by Fleetwood on Packard and Lincoln chassis.

The Collinet did not arrive till Wednesday. This was made by a new company, the Collinet Motor Co. of Garden City, Long Island. For the present the chassis is being equipped with a sport body, which, however is open to change, as it is the intention to feature a custom body. The price will be in the neighborhood of $5500. The component parts are mostly from part makers and are assembled into the chassis at Garden City. The engine is a Wisconsin, four cylinder, 4½ x 6, fitted with a Stromberg carbureter, which is fed by pressure from the tank.

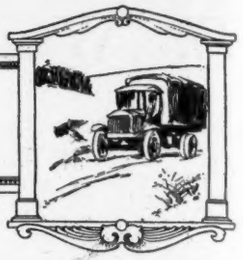
The World's Best *in* Motor Car Craftsmanship



In the left column top to bottom are: 1—Minerva sedan; 2—town car body on Lincoln chassis; 3—Rubay body with disappearing top on a Pierce-Arrow chassis: 4—showing single door and running board construction of Brooks-Ostruk body.

In the right column top to bottom are: 1—the Locombile; 2—Daniels marine body; 3—the Cunningham; 4—the Brooks-Ostruk body is of crowned aluminum, the sides being concave toward the outside

EDITORIAL



HOW THE FACTORY SERVICE MANAGER CAN HELP

PREACHING the gospel of service over and over seems to be a task without reward until one has the opportunity of listening to some other group discuss the dealer's problems and his difficulties as related to service. Then we appreciate that the dealer understands his own business a lot better than certain other groups do. The factory man very often finds it impossible to gain the correct angle on the subject of service as the dealer must regard it. This is only logical. How can one have the same regard for a subject as another, when the conditions and environment in the case of each is so totally opposite?

Let us consider these contrary conditions: The dealer is tied to the factory under a contract. His limitations are clearly defined. He must do this and this and accept the dictates of the factory. His protection gained through the contract, is in many cases of less value than the price of the paper the contract is written on. The factory, on the other hand, dictates to the dealer and hands him certain things which he must accept. The factory business is assured through the contract. The dealer's business is assured only to the extent that he goes out and builds it up. The factory men do not have the personal contact with the public; the dealers do.

Service to some factory men implies getting the parts out on time after receiving the order. Service as considered by the dealer means satisfaction to the owner and future business to the dealer. Further than this, service conditions for two dealers handling the same car in different sections of the country are as different as the country itself. In other words, every dealer has his own service problems. The factory man, however, meets the same condition whether he be shipping parts to a dealer in Florida or to Alaska.

After enumerating a few of the important general reasons why the dealer's service problems are so different from factory conditions, it seems one is entitled to point out several things which would be profitable to all concerned.

The factory service manager has a larger scope of vision than he at first thought seems to have. He has a specific and important place to fill in serving the dealer. After this task has been performed he would do far better to leave the dealer strictly alone and then tend to such other duties as it seems are incumbent upon him to perform.

The dealer finds it a very difficult problem to make money on his service business. Anything, therefore, which the factory might do to make it possible for the dealer to make money on his service will be one of the biggest contributions that the factory service man can make.

MOTOR AGE has studied the dealer's service problems, and in association with the dealer has found it to be a general rule that the flat rate plan of selling service is the only method that shows a profit. The reason for this is easy to see, but first we must explain that before service can be sold intelligently it must be considered as a commodity. Failure to do so spells failure for any plan.

When we buy a commodity we buy it for a price. If we asked the price for the mending of a pair of shoes and were told that the price would be two dollars, we would naturally expect to pay that price. However, if when we called for the shoes and were told that the price was four dollars regardless of what the price previously quoted was, we would think very little of the shoemaker.

The shoemaker finds it profitable to do business on a flat rate plan. Motor car dealers have found it possible to show a good profit when doing service on the flat rate plan. But before any dealer can quote a price on service he must know the time limits for the various tasks. This is where the factory man may use his experience to good advantage by recommending or suggesting the maximum and minimum time limits for the individual maintenance operations, which would otherwise be a costly bit of work for the dealer, especially so when new models are announced with frequent regularity.

ASSOCIATE WITH YOUR MEN

HAVE you considered the personnel of your organization? Organization is a band of men linked together to perform a duty that is too big for one individual to do. Organization demands first of all, a man for every place. That man must be fitted for his position, and above all things must be loyal. One of the foremost essentials to a successful organization is good will. The promotion of good will in an organization resolves itself into the problems of properly handling your personal. It requires diplomacy and deep thinking. It demands personality and tact.

When trouble arises and your men get dissatisfied, do you make an analysis of your business and try to get to the root of the trouble? Isn't it true that in many cases trouble arises because the men who sit at the glass top desks lose sight of the purpose of the organization? Does the sales department realize that repeat sales and satisfied customers are wholly dependent upon the men in dirty overalls out in the shop? It would pay to move away from that glass top desk, and go out into the shop and see the "greasehound" under a car doing the work that makes your business a success.

Organization demands system and to render efficient service you must have a service policy. The policy and system must be sold to your organization first of all. In many places men are in the habit of coming in a few minutes late and when working will go from one job to another all day long. Instead of charging the customer for the actual time, the charges cover complete time.

This is not service, it isn't even fair play. When this occurs your men have lost sight of the policy of the organization. Not only sell the organization policy to the men, but sell yourself. To do this you must know your men, and know what they do.

Why not get the men together for a little social time, and if the opportunity presents itself get their opinions. Every man is worthy of consideration, and his opinions will help perfect the organization. Get out into the shop so the men will know you and you will know what is going on. It pays.

Manufacturers in Favor of More Tractor Demonstrations

Show Program Will Be Decided Upon Following Columbus Event—Advertising Campaign Likely

CHICAGO, Nov. 20—An increased number of tractor demonstrations will be held the coming year by the tractor manufacturing members of the National Implement and Vehicle Association. These will probably follow on sectional lines. There will be no show before the one to be held in Columbus in February of next year. The program for shows for the year 1921-22 will depend a great deal upon the success of the Columbus event.

At the annual meeting of the tractor and thresher department of the association held at the Auditorium Thursday and Friday of this week the matter of demonstrations and shows was one of a number of subjects taken up for discussion.

The question of unified advertising was talked over and left in the hands of a committee for recommendation. The suggestion of a national advertising campaign to sell the idea of the value of the tractor to the public, the farmer and the country banker was made by F. P. Mount of the Advance-Rumely Thresher Co. Mr. Mount stated that the banker was by no means sold on the tractor idea and that the present attitude of the banks in the country is that the farmer must finance himself as far as tractors are concerned.

Sell Power Farming Idea

The campaign if started would sell the big idea of the tractor rather than exploit the merits of different makes. Mr. Mount in the course of his remarks stated that he had sent out a questionnaire to representatives of his firm in the field to learn exactly the position of the bankers. The opinion of nineteen such representatives was solicited. On the question of whether or not there are many bankers who believe that tractors are more or less experiments fourteen reported that such was the case and five reported in the negative. In answer to the question whether the banker believes that tractor development will show more profit to the farmer four of the representatives reporting conditions in their district advised in the affirmative while fourteen reported adversely and one was in doubt. Of the nineteen representatives only four said that the bankers were sure that production would increase through the use of tractors.

From this gist of opinion it was apparent that the banker has not been sold on the idea and that there must be some plan adopted toward educating him.

It was also shown at the meeting that the surface need of tractors had been obtained but that there are many farmers who will have to be gone after. There are many producers who can be made good prospects.

General business conditions were outlined by W. H. Stackhouse, president of the association.

Before adjournment the following officers were chosen for the ensuing year: Chairman, F. P. Mount; vice chairman, H. B. Dinneen, Moline Plow Co.; secretary and treasurer, E. C. Merwin, Russell & Co.

Dodge Plant Closed Pending Beginning of Intensive Drive

Detroit, Nov. 18 — Dodge Brothers closed Tuesday night for the remainder of this week, and despite a formal statement by General Manager F. J. Haynes, reports believed authentic are to the effect that practically all of the employees of the plant are idle. The bulletins posted throughout the plant simply state that the shut-down is for the purpose of making readjustments and alterations.

Mr. Haynes gave out the following statement: "The plant will be closed the balance of this week, a few days next week and a few days each week indefinitely, pending readjustments and alterations that are necessady to our plans for an intensive drive, justification for which was given in the optimistic reports of our dealers from all over the country during a series of conferences every day for more than three weeks."

Union Steel Moves to Indiana and Will Manufacture New Car

Chicago, Nov. 14—The Union Steel Mfg. Co., manufacturers of the Union reamers, tools, automobile parts and equipment, will move their plant from Chicago to Brazil, Ind., within the next sixty days and will enter upon the production of an eight-cylinder car designed along the lines of the Rolls-Royce and to be known as the "Vanderbilt." The chassis selling price will be $4,000 with body styles ranging in price from $2,500 to $7,500.

The new plant will offer a production capacity of 300 cars a year and the company will employ the same number of men.

The company is capitalized at $250,000. Ad. Judae of the Bernard Judae & Co. is president and A. J. L. Dueth, general manager.

"WESTERN RESERVE" IN FIELD

Warren, O., Nov. 22—Announcement of a new corporation to build the "Western Reserve" automobile were made here this week, personnel of the organization not made known. The product will be a passenger car. All other parts, with the exception of the engine which is made here, it is reported are made in northeastern Ohio, the territory known in Ohio history as the "Western Reserve" whence the car and its company gets its name. Details of the new organization are to be announced about Jan. 1. Patents on the motor are just being completed. The company has purchased 188 acres of land for factory purposes.

Banker Tells Sales Managers Time Payment Methods Are Bad

Urges Economy and Uniform Accounting System — Dealers to Be Drawn Closer to Manufacturers

DETROIT, Nov. 19—Referring to time payment sales W. R. Wilson, vice president of the Irving National Bank in New York, told the convention of the National Association of Truck Sales Managers that such a method had been a stumbling block in the progress of the truck industry and declared that any time sale from now on should be scrutinized carefully. He said a lack of confidence in a dealer's ability as a credit man and a business man often prompted dealers to refuse credit and he urged that nothing was more likely to aggravate such a situation than the time payment sale. In promoting a close relationship between the dealer and his banker, Mr. Wilson urged upon the sales managers that they help their dealer select his banker and at the same time help the local banker select their dealer.

System Will Aid Credit

Mr. Wilson recommended a uniform accounting system among dealers not, he said, as a matter of surveillance, but with the idea of going into the dealers' problems. He said such a system would aid the dealer materially in his relations with his banker.

He urged economy and deplored the extravagance of the last year and said that the last ten months should have burned into the dealer's mind the necessity of reinvesting his profits in his business and developing that business rather than spending the money personally or on unnecessary inprovements.

One of the most important features arising out of the convention was the determination to develop a plan of closer co-operation between dealers and manufacturers. Following a lengthy discussion, the president was empowered to name a committee of four to devise ways and means for developing a plan of meeting with dealers at intervals for an interchange of ideas between the manufacturing and selling ends.

For the following year the following officers were elected to serve: President, H. T. Boulden of the Selden Truck Corp.; vice-president, E. T. Herbig of the Service Motor Truck Co.; secretary and treasurer, A. E. Shafer of Gramm-Bernstein. Directors for one year were elected as follows: A. C. Burch, Clydesdale; W. K. Ackerman, Louis Hall; and E. D. Hand, J. C. Wilson Truck Co.; For two years, Mr. Herbig, Mr. Shafer and Homer Hilton of Oshkosh. For three years: Mr. Tracy, Mr. Boulden and W. A. Clare of Atterbury.

STUTZ PRICES

Indianapolis, Ind., Nov. 20—The prices of Stutz motor cars effective today are as follows: Roadster and Bearcat, $3900; four and six passenger, $4000.

Work on Apprenticeship Plan to Meet Need for Mechanics

Service Stations Employing More Than Five Men Included in Proposed System

MILWAUKEE, Nov. 19—Steps taken by the Milwaukee Automobile Dealers' Association to co-operate with H. J. Roesch, apprenticeship deputy of Wisconsin Industrial Conditions, are developing a feature of a co-operative nature which is putting new life into the merchandising ends of the automotive business in this city.

R. C. Chidester, Packard Motor Car Co.; E. M. Jordan, West Side Buick Co., and H. W. Bonnell, Kissel Car Co., as a committee of the dealers' association are now working out a schedule of processes upon plans suggested by Mr. Roesch for an apprenticeship system for automotive mechanics. Service stations employing five or more men will be included under a system of one apprentice for every five mechanics. There will be apprenticeship indentures, fixing the term of apprenticeship at four years, with constant educational work that will insure the apprentice a thorough training.

Thus employers will be assured against depletion in the ranks of mechanics, and mechanics will be assured of steady employment and good wages. This stabilization has been a crying need in Milwaukee service stations. The conduct of the new project is under the supervision of the Industrial Commission. Not only will the indenture provide for regular, fixed hours of study, but also for a definite, guaranteed scale of wages.

Held in Contempt of Court for Manner of Refilling Gas Tanks

Indianapolis, Ind., Nov. 19—Orion K. Stuart, proprietor of the Sun Lite Gas Co. of this city, was held in contempt of court by Judge Albert B. Anderson in Federal Court last week for violation of an injunction granted four years ago prohibiting him from refilling Prest-O-Lite gas tanks without first enameling or plating the tanks in such a manner as to obliterate the name of the Prest-O-Lite Co. and permanently plating or stamping on the tank a notice that it has been refilled or recharged.

The defense set up was that Stuart thought he was complying with the terms of the injunction when he painted out the name of the Prest-O-Lite company and pasted on the tank a paper label stating that the tank had been refilled. The question of a fine was taken under advisement.

AWAITING NEW KING ENGINE

Columbus, Ohio, Nov. 19—Mechanical engineers and especially those interested in internal combustion engines used in automobiles have been awaiting the development of the new style engine invented by U. S. King of the King Engineering Co., Tulsa, Okla., of the plant of the Columbus Gas & Machine Co., Columbus. King has constructed an engine of 90 hp. which reverses under load and goes into three speeds without the use of a friction clutch. The engine was developed especially for use in the oil and gas regions of the Southwest to take the place of steam engines. The King engine will operate with fuel oil or natural gas as well as gasoline or kerosene.

West Helps East in Snow Removal

SACRAMENTO, Calif., Nov. 19—A trainload of caterpillar tractors, sold by the Holt Co. of Stockton, to New York City, is almost ready for shipment to the East. The tractors were purchased, it is understood at the Holt factory, for use in clearing the streets of the metropolis after snow storms.

The caterpillars, after being given a thorough test, are said to have functioned perfectly in pushing and pulling huge snow plows.

California Dealers to Take Part in Legislative Meeting

Sacramento, Calif., Nov. 19—Automobile interests from all parts of the state will meet here late in November or early in December, upon invitation of Charles J. Chenu, Superintendent of the Motor Vehicle Department, to discuss changes to be presented to the Legislature in January, to the present Motor Vehicle Act.

Among the organizations to participate are the State Automobile Association, the Automobile Club of Southern California, the American Automobile Association, the County Supervisors' Association, Roads and Highways Committees of the State Senate and Assembly, California Draymen's Association, State Motor Car Dealers' Association, California Automobile Trades Association, the State Highway Commission, insurance representatives and others interested in the automobile business.

Among the subjects to be discussed are the protection of cars from theft, the increase or abolition of the present speed limit of 35 miles an hour, the loading of trucks and regulation of traffic on mountain highways.

ADVERTISING INDUSTRY

Memphis, Tenn.—In a series of page displays each week in local dailies, a message of importance is carried to the public dwelling on the reliability, permanence and scope of the motor car industry by four dealers. It also emphasizes the square deal relations between purchaser and seller for the good of the industry, honest service and the marketing of cars of recognized merit.

Newspaper Gives Ten Reasons for Purchase of Used Cars Now

Publicity Has Tended to Create Confidence in Buying Public—Brisk Trade Predicted

MILWAUKEE, WIS., Nov. 22—An example of close co-operation by a newspaper with the dealers in a community to assist them in marketing their used car stocks at a time when new passenger cars are moving against considerable resistance is found in the efforts being made here.

Every day for the past week a local newspaper has published a two-column box on the first page of the classified section, under the heading, "Ten Reasons Why You Should Buy a Used Car Now." These reasons are:

"1. Automobile dealers have reduced prices to present used car values—making loss impossible from any conditions affecting new car prices.

"2. Larger selection of used cars now than next spring.

"3. No further reductions in new car prices possible for many months—while increases are not improbable.

"4. A shortage of cars is sure to follow the curtailed production of new cars.

"5. Next spring the demand will exceed the supply—making closer markets, stronger competition in buying, and tending to higher prices.

"6. The industry has overcome the curtailed financial support—another element that tends to higher prices.

"7. An increase in new car sales involving 'trades' has resulted in larger stocks of used cars. With insufficient winter storage space and large investments in used cars, dealers prefer to sell now at greatly reduced prices.

"8. Benefits from use of car during winter months.

"9. The same high grade service of a new car is obtainable in a used car at a greatly reduced price.

"10. Buying a used car now, based on today's valuations, from a reputable dealer, is absolute protection against loss from any conditions that may affect the new car industry or market."

Local dealers consider the "ten points" as excellent propaganda for used cars as well as assisting materially in forming a new mental attitude among present and prospective owners concerning future prices. The entire advertisement has tended to create a certain confidence among all classes of people, and the prediction of brisk trade next spring is regarded as a suggestion of no mean worth.

The small two-column copy was supported at the close of the week by a three-column advertisement 14 in. deep suggesting to "Buy When Others Want to Sell." This, too, was a powerful stimulant to used car trade. The effort will be continued throughout November and December.

Problems in Industry Will Be Discussed at Ohio Convention

Trades Association Expects to Bring Together Largest Representation in State's History

CINCINNATI, Nov. 19—Cincinnati is preparing for a season of hospitality and business on a large scale in connection with the convention and exhibition of the Ohio Automotive Trades Association which will be held at Music Hall from Dec. 7 to 10 and which is expected to bring the largest assemblage of delegates and others interested in motor driven vehicles to this city that has ever attended the meetings of the association.

Registration of delegates will take place at the Hotel Sinton and Music Hall from 8 to 12 o'clock Dec. 7 and from 9 to 6 o'clock each day there will be an exhibition of automotive equipment and accessories at the Music Hall. On the afternoon of the opening day of the convention, Dec. 7, the principal address will be made by P. E. Chamberlain, manager of the R. R. Hall Cadillac Co. of Denver.

H. B. Harper, president of the National Automobile Dealers' Association, will speak on "What Constitutes Good Merchandising;" A. W. Osborn of the White Co. on "The Future of the Truck" and W. O. Rutherford, vice president of the B. F. Goodrich Rubber Co. on "The Motor Vehicle Industry, Our Confidence In It," the second day of the convention.

The afternoon of Dec. 9 Harry G. Moock, general manager of the National Automobile Dealers' Association, will speak on the "Need of Organization;" George C. Hubbs on "What Are the Real Functions of a Dealer;" Edward S. Jordon, president, Jordan Motor Car Co., on "What is Going On in the Automobile Industry;" and A. R. Kroh of the Goodyear Tire & Rubber Co. on "The Banker, the Farmer and the Motor Vehicle."

On the last day of the convention Ray W. Sherman, executive editor of the Class Journal publications, will speak on "This Year and Next in the Automobile Industry."

The president of the Ohio Automotive Trade Association is A. E. Mitzel and the president of the Cincinnati Automotive Trade Association, H. C. Mundew.

SHOWN TIRE REPAIR METHODS

Columbus, Ohio, Nov. 19—F. H. Vermillion, manager of the Miller Tire Co. school of tire repairing, was in Columbus recently giving demonstrations to repair men as to modern methods of repair. A large number of tire men attended the demonstrations.

HALLOWE'EN PARTY GIVEN

Philadelphia, Nov. 21—An unusual variety of costumes marked the big Hallowe'en party given by the Neel-Cadillac Club. More than 175 persons attended. The judges were Mrs. Percy L. Neel, and Mr. and Mrs. William Price. The prize for the prettiest costume was awarded to Miriam Dee, who characterized "The Tambourine Girl." For the most comical costume the prize was awarded to David Camp, in the role of "A Colored Sport." Edward C. Field was awarded the prize for the most original make-up, his impersonation being that of "Giant Head." Following the awarding of prizes, the first official club pin adopted by the Neel-Cadillac Club was presented to Percy L. Neel, the honorary president of the club and president of the Neel-Cadillac Co. The pin is gold and bears the initials "NCC."

Creating Prospects in South for Dealers to Follow Up

ATLANTA, Ga., Nov. 19—A special "Automobile, Truck and Good Roads" number has just been published by the Southern Ruralist, of Atlanta, the South's largest agricultural journal.

"The automobile and truck are becoming more and more important factors in the agriculture of the South, and with them, good roads," the Ruralist states. "A good road means a ready market. The man who has a good road running past his house, and who owns a truck, can sell when the prices are high. He can get to the railroad station or city and dispose of his crops at any time regardless of weather conditions. He is his own marketing agent and absolutely independent. We want to see an automobile or a truck on every southern farm. We want to see the South netted with good roads. We want to see the southern farmer more independent, marketing his produce to better advantage, and getting better prices for it."

Various topics covered in the special number included:

"The Advantage of the Automobile and Truck on the Farm."

"The Motor Truck and the Consolidated School."

"The Truck and Cream Route."

"The Rules of Automobile Etiquette."

"The Influence of the Automobile on Road Building."

"Life Insurance for Tires."

Inasmuch as the Southern Ruralist has a circulation of several hundred thousand copies to the farmers of the South this special number will doubtless accomplish a great deal of good in helping the dealers to "GET BACK TO BUSINESS."

TO MAKE SELF-FEED DRILL

Kilbourn, Wis., Nov. 22—J. C. Fitzgerald of Kilbourn, Wis., inventor and patentee of a portable, self-feed drill, is planning to engage in quantity production of the article on Jan. 1. The drill is adapted especially for garage and repair-shop and farm use as well as field work.

Twenty-five Per Cent Down by Dealer Is New Templar Plan

Credit Company Formed to Advance Remainder of Funds to Meet Purchase Price

CLEVELAND, Nov. 19—Templar Motor Co. distributors left this city after a two-day session this week at the company factory loud in their praise of a new copyrighted system for financing distributors and dealers that has just been adopted by the Templar company.

There were sixty present at the various sessions, which were held in the assembly room of the plant. Harry W. Anderson, sales manager, acted as chairman at the various sessions. At the factory office it was announced that no word of criticism of the company's policy in not reducing prices was uttered throughout the sessions.

The new plan for financing dealers and distributors was the outstanding development of the meeting. In substance it was outlined as follows: First, a corporation known as The North American Credit Co., has been organized to handle the plan. The capital stock is $10,000, all paid in. The incorporators of that concern are: C. R. Mogerth and Thomas F. Monks, vice-presidents of the Guardian Savings & Trust Co.; E. D. Rogers, president of the Rogers-Moore Co., and vice-president of the United Alloy Co., Canton; former Judge Walter D. Meals and W. Jackson, of this city.

The distributor in making his purchases of the factory pays 25 per cent down, and the credit company produces the remainder of the funds needed to meet the factory purchase price. On the money owing to the credit company the distributor pays 8 per cent interest and he pays the principal sum in installments of 2½ per cent of his gross profits per month.

In addition he gives a surety bond, the premium being $15 per thousand, the bond insuring the credit company against wrongful disposal of the property purchased or of the proceeds of the sales of cars.

A similar scheme has been worked out for the financing of the dealer, who also pays 25 per cent down, the credit company furnishing the remainder of the money needed to meet the distributors' price. The credit company has made arrangements that assures it ample capital to handle the distributors and dealers, according to Mr. Jackson, who also asserted there is no financing plan like it.

The session of distributors open to criticisms and suggestions brought forth the fact that distributors are optimistic about the future.

At offices of the company it was stated that Templar Motors has slowed down production until only sufficient men have been retained to supply actual orders received and to turn out show cars. Plans for the new year call for increased production, and the new financing plan for dealers and distributors is expected to help business greatly."

Consolidation of Companies Made by Kansas City Dealers

Purpose in Cases Is to Curtail Expenses and Render More Efficient Service

KANSAS CITY, MO., Nov. 20—The consolidation of several local automotive firms during the recent month has been made in many cases to curtail expenses and render more efficient service to car owners.

One of the largest consolidations which has effected the automotive market for some time occurred during the past week in the incorporation of the Kirkland-Cravens Motors, Inc., by the Buxton-Phillips Motors Corp., distributors of the Chalmers and Maxwell cars and the Cravens Motor Co., distributors of American cars and Tulbert trucks. The consolidation of these strong organizations forms one of the strongest companies operating in this field. The main object was for the increase of capital, now incorporated to the amount of $200,000, fully paid in.

The president of the new company is H. G. Kirkland who was organizer of the Buxton-Phillips corporation which took over the Chalmers branch here in 1917. Walter Cravens, formerly president of the Cravens company is vice president and treasurer. The other officers in the former companies become officers in the consolidated concern.

For the present the new company will occupy the location of the Buxton-Phillips corporation using the sales room of the Cravens company for used passenger cars and trucks. It is the plan of the company to erect a new building after the first of the year.

The Prairie Motors Co., local distributors of Scripps-Booth passenger cars and the Kagey Motors Co., distributors of R. and L. electrics and Owen Magnetic cars recently joined interests to form the new Consolidated Motors Co. Harry S. Young is director of the service department beside fulfilling the duties of director and secretary of the new organization.

INDIANAPOLIS SHOW IN MARCH

Indianapolis, Nov. 21—The Indianapolis automobile show will be held in the automobile show building at the Indiana state fair grounds March 7-12 under the auspices of the Indianapolis Automobile Trade Association, John B. Orman, manager.

"SA-YES" CAMPAIGN PROGRESSING

Philadelphia, Nov. 11—The "Sa-Yes" campaign started on Oct. 15 by the Federal Motor Truck Co., main factory, Detroit, is progressing so well in the Philadelphia factory branch territory, according to William H. Bartleman, branch manager, that business has received a considerable impetus. The idea is to get prospects to "say yes" when the time comes for the close of a sale and to boost truck transportation, move crops and benefit industry generally. It is an intensive sales drive and reports from the factory and other branches, Mr. Bartleman says, show that it brought business from a point considerably below normal to ahead of normal for this time of year. Prizes of various kinds have been offered to salesmen. The drive will close on the last day of November. Mr. Bartleman says that since the start of this campaign not a Federal distributor or agency has failed and not a salesman laid off. Special advertising including letters and printed matter, has helped boost the drive.

Need of 120,000 Service Men Reeves Tells Chicago Dealers

Chicago, Nov. 18—More than one hundred members of the Chicago Automobile Trade Association gathered at the Metropole Hotel at luncheon yesterday to hear Alfred Reeves, general manager of the National Automobile Chamber of Commerce speak on projects in the automobile industry. This was the third of a series of luncheons which the Chicago dealers are holding. At the first the speaker was Edward S. Jordan, president of the Jordan Motor Car Co., and at the second, Percy Chamberlain, nationally known expert on service.

There are needed at the present time 120,000 service men throughout the country, Mr. Reeves stated and emphasized the seriousness of the service question.

He felt, also, that Christmas buying would affect the automobile dealer favorably, predicting that there would be renewed buying of cars with the ushering in of the Christmas season.

MERCEDES AGENCY IN CHICAGO

Chicago, Nov. 19—A Mercedes agency has been opened in this city and the latest importations of Mercedes motor car chassis are on display at 3515 Michigan Avenue. The offices of the agency are located in the Michigan Boulevard building.

Paige Dealers Holding Truck Demonstrations for Farmers

Meetings Are Being Held on Farms Offered for Purpose—Addresses Feature Them

CINCINNATI, Nov. 22—The plan of the H. & T. Co., Paige dealers in this territory, in staging special truck demonstration meetings in its territory is marking a new era in taking the motor to the farms around Cincinnati.

Stimulated by the success of its recent demonstration at Dry Ridge, Ky., the company has staged several other demonstrations and C. W. Hutchinson and Phil Trounstine have mapped out a campaign for a series of farmers' meetings at which Paige trucks will be demonstrated with farm power machinery, accompanied by instructive and inspirational talks.

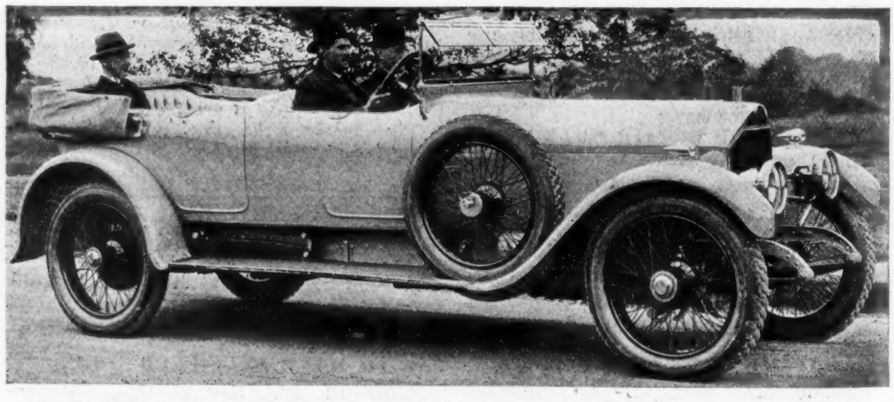
Besides Dry Ridge, demonstrations have been staged at Lebanon, Ky., and Harrison, Ohio, and several others are to be held soon. All gatherings so far have been held on farms offered by prominent farmers, and have been attended by large gatherings, although it was the farmers' busy season.

The program includes a demonstration of Paige trucks with power take-off by Paige salesmen; demonstration in plowing and operation of cultivating tools with a "Utilitor," provided by the Midwest Engine Co., with a demonstrator, and talks on diversified farming through tillage and the necessity of motorization to keep up with the demands of the future by A. R. Kroh, farm efficiency expert.

DISTRIBUTORS CONSOLIDATE

Milwaukee, Nov. 19—The Raymer-Romaine Co., Fond du Lac, Wis., is the new name of the consolidation of the Engles & Romaine Co. and E. Eugene Raymer Co., distributors of tractors and farm operating equipment.

The Napier—A European Design



An English car which has been completely redesigned since the war, is the Napier, a view of which is shown above. This car, although of a fair size, is rather light because of the extensive use of aluminum in its construction. The engine has six cylinders and is rated at 40 to 50 hp. The cantilever springs which are employed are very long. The illustration gives this impression partially. Embodied in the engine are many features of construction which were employed in the Napier aviation engine

Arrangements Completed for Farmer's Annual Summer Tour

Camping Plans Will Follow Those of Michigan Pikes Association—Demonstrations on Trip

DETROIT, Nov. 19—Directors of the Michigan Farmers' Automobile Tour Association have completed the routing for the jaunt next summer which will consume fifteen days, starting from Battle Creek Aug. 8, with Pittsburgh, Pa., as the eastern objective. The farmers will pitch camp the first night at Adrain where a farm and grange rally will be held at which tractor and farm machinery demonstrations will be featured.

The tourists also will camp at Norwalk, O., Cleveland and Akron where they will be guests of the Mohawk Rubber Co. They will reach Pittsburgh Aug. 13 and will leave there the following day camping in Wheeling Aug. 15. The next three camps will be in Zanesville, Columbus and Cincinnati after which the tourists will cross into Indiana and spend a day at Indianapolis before starting on the last leg of the home journey.

The plan of camping will be similar to that originated by the Michigan Pikes Association Tour last summer and each automobile will carry its own camping and cooking equipment. Trucks will carry excess baggage and camp paraphernalia.

TO JOIN OTHER BODIES

Kankakee, Ill., Nov. 15—The recently organized Kankakee County Automotive Trade Association held a special meeting here for the purpose of voting upon affiliation with the state and national organizations. The meeting was addressed by F. C. Zillman, manager of the Illinois Automotive Trade Association, who urged support of the parent organizations, stating that only unity among the dealers could insure adequate protection of their interests. Inclement weather, however, kept the out-of-town dealers from attending the meeting, and another will be held on Nov. 22, at which time it is anticipated the new organization will affiliate with the Illinois Automotive Trade Association and the National Automobile Dealers' Association.

ALLEN SITUATION IMPROVING

New York, Nov. 19—Nearly 95 per cent of the $500,000 which will be used to put the Allen Motor Co. of Columbus on its feet and lift the receivership, has been subscribed by the stockholders and bank creditors. The outlook for the future is more hopeful than it has been at any time and there is every reason to believe the receivership will be raised in the near future. The company is doing a good business and is being operated in an efficient and economical manner.

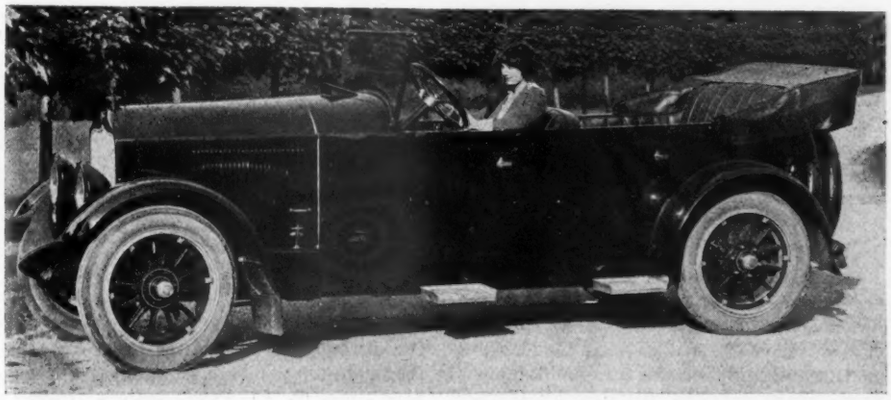
NEW CASTLE TO RESUME WORK

New Castle, Pa., Nov. 22—Operations at the New Castle Tire & Rubber Co. probably will be resumed about Jan. 1, according to announcements of W. E. Duerstin, general manager. The plant has not been operating since Oct. 1. During the shut-down tire stocks have been completely cleared out. "We have been busy liquidating inventories and are now in a position to resume operations on a scale justified by new business that already is beginning to come in," said Mr. Duerstin. "Price announcements will be made soon and we expect to be in production within six weeks."

INVENTS FORD CLUTCH

Capac, Mich., Nov. 21—Corey Leach of this city has invented an improved clutch for attachment on a Ford truck and arrangements are now being made to manufacture the clutch in this city.

The New National Sextet Phaeton



This model has cast aluminum steps in place of running boards, and appears to hug the ground in the manner characteristic of the European cars, yet standard road clearance is maintained. The unusually low effect has been secure dthrough the method of body mounting followed by National, in which the body is suspended on brackets riveted below the upper edge of the chassis frame, dropping the body sides several inches closr to the ground. Squeaks and rattles are banished through the increased ragidity of the body support, the seill being laid on edge, instead of flat, and overlapping the chassis frame

Storing Up Cars Expecting Heavy Demand Next Spring

Firm to Take Advantage of Improvement in Shipping Conditions to Get Cars

BUFFALO, Nov. 21.—The Meyer Motor Co., which distributes the Reo and Peerless cars in Buffalo and surrounding territory, believes the demand for automobiles next spring will exceed that of any corresponding season in the past. So firm is its conviction that the pending depression in the automobile business is merely temporary, that it is preparing to place orders for $100,000 worth of cars, and it is planning to get from the factories in the next two months, as many of them as it can.

"Present transportation conditions," said Clayton Meyer of that company, "make it possible for us to get cars through from the factories quickly and the outlook is that the shipping situation will continue the next eight weeks, anyway. It is our intention to take advantage of it fully. We plan to get the cars here, and store them during the winter, then, when the demand comes in the spring, as we confidently believe it will, we will have the automobiles right where we can lay our hands on them, and when customers come in we will have cars for immediate delivery."

Believe Slack Is Seasonal

The Meyer company sees nothing alarming in the present slump in the automobile business, believing it to be nothing more than the slowing up that invariably comes with the departure of summer. The belief of this company that the demand for cars next spring will be larger than any like season rests on the reasonable presumption that the annual increase in the number of buyers, which has manifested itself every year since motoring began, will again be in evidence and that the number of prospects will be augmented by many who would have bought in the fall or winter but for the hope of lower prices.

Mr. Meyer and his associates figure that the price situation will have stabilized itself by spring to the extent that there will be no reason for even the most hopeful to hold off longer for reductions.

DEATH TAKES F. M. BALL

Detroit, Nov. 21—F. M. Ball, president and general manager of the Ball & Ball Carbureter Co., died after an illness of two months. He was widely known in the engineering field by his connection with the development of the high speed engine prior to engaging in the carbureter business. He organized the Ball Engine Co., Erie, Pa., the Ball & Wood Engine Co., of Elizabeth, N. J., and the American Engine Co., of Boundbrook, N. J., prior to coming to Detroit. He had been in the carbureter business ten years. Funeral services were held in Buffalo.

Champion Wins Spark Plug Suit Against Omaha Company

Amount of Damages to Be Proved Later—Unfair Competition Basis of Action

OMAHA, Nov. 19—The Champion Spark Plug Co., Toledo, won its suit against the Myles Standish Co., Omaha, in the United States District Court, Nov. 12. Infringement of the Stranahan patents and imitation of the Champion X plug for Fords were alleged and the defendent was restrained on both points, with the amount of damages to be proved later by Champion. The trial consumed two weeks, before Judge Woodruff. Bonds on appeal were fixed at $5000 in the patent case and $25,000 in the unfair competition suit. The court refused to forbid Champion to use the decision in its advertising.

The Court in its opinion pointed out that Champion has had a contract with the Ford Motor Co. since 1911; that Champion has sustained an estimated loss of $500,000 since that time through selling its plugs to Ford; that $500,000 has been spent in advertising by Champion; that this loss and this advertising have created a good-will for Champion which assured it replacement business from Ford owners; and that this goodwill is a property which the Court should protect.

The unfair competition allegation was that Standish used on its cartons cuts which were deceptive and that the Standish plug was sold as "One-half inch Standard spark plug for Fords." The opinion stated that any imitation product must be so labeled and sold that the buyer clearly understands what he is buying, and that one manufacturer has not the right to trade upon the goodwill or reputation of another in an unfair way.

Thirty-nine Trade Bodies in South Show Dealer Optimism

New Orleans, La., Nov. 19—Some idea of the enthusiasm and optimism which the southern dealers are tackling the winter season may be gathered from the fact that in nine southern states there are thirty-nine separate associations of dealers and distributors, all in good condition, all growing, and most of them established within the past three years. The majority of these associations have held meetings within the past 60 days; many of them, such as the New Orleans Automobile Dealers' Association, meet once a week, and, incidentally, these get-together meetings each week have done more to keep the New Orleans dealers right up in front and working every minute than anything else they have done.

The nine states having this great association activity are Louisiana, Mississippi, South Carolina, Tennessee, Texas, Virginia, Florida, Georgia and Alabama.

These thirty-nine associations embrace a membership of approximately 4200 according to correspondence with their secretaries, and this is believed to be about 70 per cent of the dealers and distributors and equipment men in the nine states named, though there are a number of dealers, especially in the smaller towns, who are not members of any of these organizations. The Louisiana-Mississippi Association probably comes nearer to having within its membership all the dealers in the two states than any other of the southern associations, but most of these are reaching out this fall and winter for larger memberships.

Dealers Themselves to Manage Annual Los Angeles Car Show

Los Angeles, Nov. 21—This year's automobile show here, as have been all recent predecessors, will be conducted wholly under the auspices of the Motor Car Dealers' Association and handled by a committee of the dealers. By doing away with the necessity of a paid manager it is the expectation of the association to put into its treasury an amount that would represent the services of such an official.

The committee is devoting practically all of its time to next month's event and all members serve without compensation. Many show managers render their services on the basis of one-half of the profits. It is the plan of the association to put one-half of this year's profits, if any, into the treasury and refund the other half to members in the nature of a rebate on the cost of floor space. The entire expense of the show will be guaranteed from the proceeds of the sale of floor space before the doors open so the event cannot be conducted at a financial loss.

TIRE DEALERS ELECT OFFICERS

St. Louis, November 20—Joseph Roberts of the Roberts Motor Tire Co. has been re-elected president of the St. Louis Tire Dealers' Association. Other officers named follow: Vice-president, Art B. Mooney, Art B. Mooney Tire Co.; secretary, Robert E. Lee; directors, G. F. Poertner, Majestic Tire Co.; Joseph Kuemmerle, B. & K. Tire and Equipment Co.; I. Riefler, Independent Tire Co. and Auguste Chouteau, Lee Tire Service Co. New members elected were: Field-Lippman Co. and Zerwek-Grayson Co.

BOSTON HEARS MARMON HEAD

Boston, Nov. 19—The last of this year's series of conventions of all Marmon dealers and salesmen in New England has closed with a dinner and addresses on the condition of the automobile business throughout the country by Walter C. Marmon, president of the Nordyke & Marmon Co., and H. H. Brooks, assistant sales manager. About sixty men, representing Frank E. Wing's Marmon force in New England met at the showrooms, and discussed the problems of sales and distribution, under the direction of Joseph G. Morgan.

New Company Gives Service on Cost Plus 10 Per Cent Basis

Accessories and Parts Sold to Members by Service Organization on Same Plan

ATLANTA, Ga., Nov. 19—The Auto Hotel Co-Operative Service Co. is the new name of the Auto Hotel, of Atlanta, which will operate a co-operative service station for a large club of automobile owners on a cost plus 10 per cent basis. The plan is something entirely new in the South.

The idea is that the company will accept a certain number of members of the club, will maintain a large corps of expert mechanics and a thoroughly equipped station, and give service to the cars of all bonafide members charging only ten per cent above the actual cost. Each member is required to sign a contract with the company and pay $25 for one year's membership in the club. All accessories, parts, tires, etc., are also sold on the cost plus 10 per cent basis. The 10 per cent is to take care of overhead expenses, these not being figured in with the cost when service jobs are rendered. The company expects to realize its profits from memberships, and will accept only a limited number so that the capacity of its plant may not be overtaxed.

R. D. Leonard, H. L. Turner and J. C. Elliot, are the owners of the new enterprise.

Business of Magneto Makers to Be Conducted by Receivers

Buffalo, N. Y., Nov. 21—William A. McDougall and Robert E. Powers have been appointed receivers of the Ericcson Manufacturing Co., manufacturers of magnetos and other electrical appliances. The appointment was made by Federal Judge Hazel on the petition of a foreign creditor represented by Attorney Carl H. Smith, who also is secretary of the company. The proceeding was a petition in equity, the papers plainly stating that the petitioners are of the opinion that the Ericcson company is solvent. It was with this point in view that Messrs. McDougall and Powers were appointed receivers, it being the plan as at present outlined for the receivers to carry on the business.

CONDITIONS IN MEXICO IMPROVE

El Paso, Texas, Nov. 19—As a result of the improved conditions in Mexico the automobile and motor truck trade in that country shows a wonderful increase, according to El Paso dealers, four of whom have just returned from a trip of investigation of trade prospects in several of the larger cities of that country. In this party were E. G. Perry, Lone Star Motor Co.; F. M. Bannell, El Paso Overland; O. C. Youngblood, Pry Motor Co., and Sam Watkins of the Watkins Motor Co.

To Stage Circus Features at Highway Transportation Show

Contests of Educational Value Are Also Being Planned to Draw Crowds

NEW YORK CITY, Nov. 21—Attention is now being focused on the selection of methods to draw the crowds to the Highway Transportation Show to be held here on Jan. 3 to 8, 1921, at the 12th Regiment Armory and the First Field Artillery Armory. The work of drawing the crowd has been assigned to Lieut. William B. Doran, who is exceptionally well qualified for his work by reason of his past experience as publicity officer of the first transcontinental motor convoy via the Lincoln Highway, recruiting and Liberty Loan compaigns during the war and in the development of the Firestone Ship-By-Truck Bureau in New York. Many circus stunts and contests of educational value will be staged to draw the owner and driver attendants while speakers of great prominence will be secured to draw the general public including the business man who knows something about highway transportation but wants to learn more before installing motor trucks in his business.

Each day of the week has been set aside to cover some important phase of highway transportation both in the exhibits to be featured and in the selection of prominent speakers. Monday, Jan. 3, will be known as Opening Day; Tuesday, Army Day; Wednesday, Motor Accident Prevention Day; Thursday, Transportation Day; Friday, Farmer's Day; and Saturday, Motor Truck Association Day.

Every attempt is being made to make the exhibition one of great educational value to the business man, the motor truck owner and driver, and with the exception of the opening day address, all the speeches will be made in the large auditorium of the armory where every facility will be offered for the discussion and fuller understanding of the various highway transportation problems.

Demand for Parts From Dealers Is Cause of Overland Inventory

Detroit, Nov. 20—In view of the many reports regarding plans for the future of the Overland plant at Toledo much significance is attached to the fact that the homes of John N. Willys, president of the Willys Corp., and C. A. Earl, vice president of Willys-Overland Co., have been offered for sale. The offers, according to information from Toledo, were made to men of large means who are seeking larger homes.

Neither Mr. Willys nor Mr. Earl could be located today but officials at the Overland plant said there was no significance in the fact that either was willing to sell his home if he saw a chance to make some money, if it was true that the offer had been made. W. H. Kilpatrick, vice president in charge of production said the fact that the parts department of the Overland plant has been putting 2000 men back at work was sufficient response to rumors that the plant would be down indefinitely. The entire plant again would be in operation, he said, as soon as the inventory was completed.

Mr. Kilpatrick said the inventory was started in the parts department because of demand for parts from dealers all over the country and said day and night shifts were working to complete it so that the work of checking up the other departments as rapidly as possible could be taken up.

Come to Meetings or You Can't Exhibit at Show

KALAMAZOO, MICH., Nov. 20—The Kalamazoo Automobile Dealers' Association will give a show during either January or February next. The definite date will be announced in a short time. The association has been reorganized and revived. Robert L. Duffus is president and Burt F. Moulton, secretary. The executive head has some very set notions regarding the successful operation of the local organization and proposes to instill life in the lukewarm faction. Failure to attend three regular meetings of the association will result in forfeiting the right to participate in the annual exhibition.

ALLOT CLEVELAND SHOW SPACE

Cleveland, Nov. 21—Allotment of space for the 1921 automobile show, which will be held in Wigmore Coliseum Jan. 22 to 29, has been begun by show managers and the result has been gratifying. Seventy-two makes of cars already are represented in the space allotted and predictions have been made that there will be a greater variety of models this year than ever has been assembled at a Cleveland show. Although extra space was obtained this year indications are that it will not be sufficient to meet the demands and the requisitions of some will have to be cut down considerably.

DEALERS SEE SERVICE SCHOOL

Atlanta, Ga., Nov. 18—An intensive service school under the direction of G. C. Tillman, of the Southern Nash Motors Co., featured the annual convention of Nash dealers in the Southeast, held in Atlanta this week. About fifty dealers attended the meeting.

C. B. Vorhees, vice president and general sales manager of the Nash Company, of Kenosha, Wis., was the principal speaker at the convention, giving the report of a service school for Nash distributors recently held at the factory.

Dinner to Be Given Second Night of Louisville Show

Dealers' Association to Observe Washington's Birthday in Connection With Car Display

LOUISVILLE, Ky., Nov. 19—Louisville's thirteenth annual automobile show, which will be held at the Jefferson County Armory, Feb. 21-26, is expected to break all records for attendance from out of town and for elaborate entertainment, members of the Louisville Automobile Dealers' Association declare.

The association Friday night at a called meeting at the Seelbach voted unanimously to give a dinner the night of Washington's Birthday, the second night of the show, at the Seelbach, to which every dealer in Kentucky will be invited. Plates will be laid for at least five hundred and after the dinner the visitors will be entertained by a cabaret show at the armory. Other entertainment plans are in preparation. William O. Protsman suggested the banquet and cabaret.

Every automobile dealer and accessory dealer in the city will be urged to exhibit. By unanimous vote the exhibition fee was fixed at $12.50 a foot on the first floor and $7 a foot on the balconies.

Truck Committee of N. A. C. C. Making Progress in Campaign

New York, Nov. 15—Considerable progress is being made by F. W. Fenn, secretary of the motor truck committee of the National Automobile Chamber of Commerce, in his campaign to have a transportation committee included in the organization of every Chamber of Commerce in the United States.

This committee, as proposed by Fenn, would be composed of one or two manufacturers, a prominent railroad official, a motor transport operator and one or two farmers. If the city is located on a waterway a marine transport operator would be included in the membership. Attached to the committee would be a traffic manager and a farm secretary.

It would be the duty of the farm secretary to co-operate with farm bureaus for the development of outlying rural districts to insure a market for the farmer's products and thereby increase production. New markets would be opened by the use of motor trucks. One phase of the work of the committee would be to find work for trucks and establish tariffs which would insure the confidence of shippers.

Short haul, less than carload lot business would be separated from the long haul business which logically should go to the railroads. The terminals would be kept clear and it would be possible to mobilize trucks in case of emergency. The committee would supervise and systematize transportation and assist in keeping cars moving on the railroads.

Gives Salesmen Wide Latitude in Coast Drive for Business

Demonstration Cars at Their Disposal—Blanket Instructions to Sell Anything in House

LOS ANGELES, Nov. 22—In the drive for business that now marks the efforts of every automotive dealer in this city well established precedents are being overthrown. Customs that may have been satisfactory in the past but are not proving equal to the present are being cast into discard in favor of something new.

For one thing, it is a great deal easier to arrange for a demonstration now than it was six months ago. Dealers who felt that they could sell cars without demonstrating them and who succeeded in making good in this premise are now encouraging this line of enterprise on the part of salesmen. The long familiar line "Demonstrations at Your Convenience" is again appearing in advertising. Dealers who allowed only two demonstrating cars for six salesmen are now providing each salesman with a car and salesmen who, in many instances, had to buy a car to make certain of a demonstrator are now riding at the expense of the house.

For years, also, it has been the general practice to restrict salesmen to stipulated efforts. That is, a used car salesman was not permitted to sell a new car or vice versa. This order of things is changing and now salesmen have blanket instructions to sell anything there is in the house that they can find a buyer for. Sales forces are being increased and previous experience is not regarded as a necessary asset for the job.

Move the Used Cars

Recognizing that it is essential that used cars be moved as well as new ones and used cars not now being much in demand prices are being reduced to the extent that it is possible to purchase a good used car for less than the dealer's investment in it. One firm is resorting to extensive display advertising featuring endorsements from used car dealers on the merits of their line and the resale value of the car. The natural presumption is this distributor would like to see all used cars of his make now on the market disposed of so that the demand could be stimulated.

Duesenberg—America's First Vertical Eight

(*Concluded from page* 15)

space behind which is filled with oil. This master cylinder is pivoted to the frame at its closed end, and the piston rod connects through a link with a frame bracket below the cylinder.

From the pivot joint between the piston rod and the link a short rod extends forward to the brake pedal, the arrangement of this link mechanism being such that a toggle effect is produced when the brake pedal is depressed. From the closed end of the master cylinder, oil distributing lines extend to the brakes at the four wheels, these lines consisting partly of seamless steel tubing and partly of flexible steel tubing. The lines to the rear brake extend most of the way along the diagonal brace rods of the rear axle, and are therefore inconspicuous and well supported.

Lines Protected by Frame

The lines to the front wheel brake extend for a certain distance along the frame side members, and the rest of the distance parallel with the front springs, positions affording a certain amount of protection to the lines. The latter part of the oil leads to the front wheel brakes, is machined in the axle end forging, and there is a swivel pipe connection at the upper end of these forgings, which do away with the necessity for exposed flexible tubing.

The general arrangement of the hydraulically operated brake is quite clear from the accompanying illustration. The brake drums, which are 15 in. in diameter, with an effective width of face of 2¼ in., are made by the rolling process and are cut with cooling ribs on the outside, in accordance with a custom that originated in racing practice. The brakes are of the expanding type, and the two sectors are pivoted on a stud projecting laterally from a post or column extending down from the axle end forging. The upper ends of these brake sectors are connected together by the hydraulic cylinder and piston combination.

As the hydraulic cylinder of the brake has a slight motion relative to the steering knuckle, it is necessary to use a flexible tube of sufficient length to prevent undue strain by bending in applying the brakes. The brakes, of course, are fully enclosed. The oil is conducted from the passage in the axle end to the passage in the steering knuckle by means of the swivel pipe connection already referred to.

When pressure is applied to the brake pedal, oil is forced from the master cylinder through the pipe lines to all four brake cylinders, and the brake sectors are applied to the internal surface of the brake drum with great force. As soon as the pressure on the brake pedal is released, the return springs withdraw the brake sectors from the brake drum. This hydraulic system for the transmission of brake actuating pressure, not only does away with a multitude of links and levers, but also equally distributes the braking work between the four brakes.

In addition to the hydraulically actuated service brakes, there is an emergency brake which is mounted on the front end of the propeller shaft, rather than on the rear end of the transmission, and therefore relieves the fabric universal joints of the braking strain.

The new Duesenberg straight eight has a wheelbase of 134 in. and when fitted with a 4 or 5 passenger aluminum body weighs in the neighborhood of 3100 lb. Special pains have been taken in the design to keep the weight of the complete car as low as possible, and aluminum parts are used very extensively. Thus, the dash and the foot board are aluminum castings, as is the radiator shell.

Buick Reduces Production and Length of Working Day

Curtailment Necessary to Meet Readjustment—Hope for Improved Conditions Before Year's End

DETROIT, Nov. 17—Buick Motor Car Co. has reduced production from 540 cars a day to 350, and will operate temporarily on a six-hour day basis. The company's announcement to its employees said it had adopted the shorter work day as affording the greatest good to the greatest number during the time of lessened production. Further reductions in the organization will not be made unless conditions which control the general manufacturing and selling situation make them imperative.

Minimize Hardships

Curtailment of production was made necessary, the company said, to meet the business emergency and readjustment affecting all industry. By spreading the production over the greatest extent of the organization it aimed to reduce the discomforts of the readjustment to a minimum. Hope is expressed in the announcement that conditions dictating the reduced output will be overcome by the close of the year.

PAINTING DEPARTMENT ADDED

Philadelphia, Nov. 19—A new combination for this city, that of a department of automobile painting added to a general automotive electrical engineering business, is being tried with success by Dambly & Walker.

New Pierce Arrow Models Are Distributed for Exhibition

Buffalo, Nov. 19—Buffalo was given the first opportunity to see the new Pierce-Arrow passenger cars. Salesmen and distributors of the company, the press and others were invited to attend a preliminary showing of forty of the new cars in the 74th Regiment Armory. The cars shown had an aggregate value of more than $250,000.

The cars were then distributed for exhibition purposes. Ten went to each of these cities: New York, Boston, Philadelphia and Buffalo, each group representing the company's new and complete line.

Charles Clifton, chairman of the board of directors of the company, spoke at the dealers' convention, outlining the firm's new production policy.

Concerning Men You Know

Will C. Heath, general superintendent of the main works of Fairbanks, Morse & Co. at Beloit, Wis., has been promoted to general manager, succeeding W. S. Hovey, who has been elected a vice-president, in charge of all plants and production, with headquarters in Chicago.

Ralston Biddle, formerly vice president and sales manager of the Biddle Motor Car Co., has associated himself with the sales department of Grieb & Thomas, Philadelphia distributor of Kissel, Renault, Briscoe and Grant cars.

T. K. Jarrard, vice-president and general manager of the Apperson Brothers' Automobile Co., is on his way to the coast and in his tour of the western territory plans to make his first stop at San Francisco.

Louis Cohen, for six years past a member of the Chandler sales force of the Peacock Motors Co., San Francisco, has become sales manager of the W. J. Benson Co., distributors of the Stephens Salient Six for northern California.

Vernon Trevellyan, formerly with the Mack Truck Co. of Chicago, has been made branch manager of the Mack Truck Co. branch in Kansas City. The Kansas City house will handle Kansas, Oklahoma, Missouri and northwestern Arkansas sales. Sub-branches at Tulsa and Bartlesville, Oklahoma, work directly under the Kansas City branch. More than twenty distributors in this territory are under the local branch.

The Poll-Ells Co., whose plant at Buffalo is nearing completion, plans the production of thirty all steel airplanes daily. It is also planned to build a three-passenger plane with a speed of 100 m. p. m. The planes are planned for commercial flying.

L. C. Wilson, for the last two years general sales manager of the Chain Belt Co., Milwaukee, has been elected secretary of the Federal Malleable Co., West Allis, Wis. He will be succeeded by Clifford F. Messinger.

Paul Fitzpatrick, vice president of the General Motors Acceptance Corp., New York, has sailed for Genoa to study conditions in Europe.

Charles F. Van Sicklen, one of the most prominent figures in the automotive industries since their inception, has become associated with the Briggs & Stratton Co. of Milwaukee as vice-president in charge of sales. Mr. Van Sicklen assumed his new duties Nov. 15. The Briggs & Stratton Co. is one of the largest makers in the world of electric switch panels, ignition switches and locks.

Edward Levy, Jr., sales manager for Standard trucks in Pittsburg, has become retail sales manager of the Indiana motor truck department of the Auto Trading Co., of the same city.

C. R. Stowell has been appointed manager of the Fresno, Calif., branch of the Bearings Service Co., which acts as the service department of the Timken Roller Bearing Co., the Hyatt Roller Bearing Co., and the New Departure Manufacturing Co. A. F. Ward, until recently assistant service manager of the Timken-Detroit Axle Co., has been made manager of the Omaha branch of the Bearings Service Co.

C. C. Bradford has changed the name of the selling company which he formed recently from the Manufacturers' Sales Co. to the Bradford Sales Co. The offices of the company which will represent not more than two manufacturers as a district sales office of each are located at Cleveland.

Tickets for Indianapolis Race Will Be Placed on Sale Jan. 1

Indianapolis, Nov. 19—Plans are being laid for the 500-mile automobile derby at the Indianapolis Motor Speedway May 30, 1921.

Scarcely a day has passed since the finish of the classic that orders for tickets have not been received. Tickets will go on sale Jan. 1 but all orders will be filed and filled in the order of their receipt.

Literature and diagrams of seating arrangements are being printed and will soon be ready for distribution. The mailing list of the speedway management is very large. The name and address of practically every person who purchased tickets for the last race was tabulated and those persons will soon be written to.

It has taken six months of steady clerical work to clear the office of traces that followed the race last May which was witnessed by more than 125,000 people and the management of the speedway has now turned its attention to the coming event. The successful race of this year and present indications forecast another record breaking crowd.

TEACHING CHILDREN ROAD RULES

Columbia, S. C., Nov. 21—Inclusion of courses designed to teach children the rules of the road and road courtesy will be urged upon South Carolina school officials by the South Carolina Automotive Trades Association. The association will be joined in its efforts to have these courses included in the school curriculum by the textbook committee of the highway committee of the bureau of education. While definite recommendations for courses to be included have not yet been drawn up, they will follow in a general way the courses used in the schools of Detroit and some Ohio cities. It is believed that such instruction will lessen the number of motor accidents and that it will also develop road courtesy to a high degree of excellence.

SUPPLEMENT R & V KNIGHT LINE

East Moline, Ill., Nov. 19—The six cylinder R & V Knight line will be supplemented by a four-cylinder model which will be ready for distribution early next spring. The price of this new car will be $2150, and it will be made in two body styles — a five-passenger touring and a five-passenger sedan. The same general lines of construction used in the six will be followed in this model.

The prices on all the six-cylinder models have been guaranteed to May 1. The present prices are $3350 on all open cars, $4000 on the coupe, and $4200 on the seven-passenger sedan.

NO ALL-AMERICAN RECEIVERSHIP

Chicago, Nov. 22—The petition for appointment of a receiver of the All-American Truck Co., was dismissed by Judge Carpenter in the United States District Court here today. Local banking interests have furnished additional working capital, it was stated. The company is solvent to the extent of $568,000 above its liabilities.

CASE BUYS IN ATLANTA

Atlanta, Ga., Nov. 19—The J. I. Case Threshing Machine Co. has purchased a large four story building here as a southern warehouse and distributing headquarters for the Case lines. Virtually all of the large tractor and implement manufacturing companies have now established southern or southeastern headquarters in Atlanta, and they are preparing to handle the largest volume of business during the next six or eight months they have ever experienced in this territory. It is the opinion of most dealers and distributors here that more tractors will be sold in the southeast between now and planting time next spring than ever before in the history of the industry.

"Peptomism," Watchword at Philadelphia Dealer Dinner

Philadelphia, Nov. 21—The Hatch Motors Co., Marmon and Hupmobile distributor, gave a dinner at the Bellevue-Stratford hotel to its sales force and dealers to afford them the opportunity of meeting officials of the Marmon factory and of the local sales organization.

Walter Marmon, president of the Nordyke & Marmon Co., of Indianapolis, and H. H. Brooks, assistant salesmanager of the factory, were present and told the diners about their factory plans and interest in the Philadelphia distributorship. Addresses also were made by Colonel Hatch and H. G. Pearce, salesmanager of the Hatch Motors Co. The newly coined word, "Peptomism," was sprung as a watchword—being a combination, of course, of "pep" and optimism.

GRANT SIX MEN ON COAST CONFER

San Francisco, Nov. 19—F. E. Stratton, general sales manager of the Grant Six factory, presided at a sales conference of the Frank O. Renstrom sales forces and department heads, held at the San Francisco Renstrom headquarters last week. The Grant factory man has big plans in view for the coming year and these were imparted to the local Grant forces during the course of the conference. Richard Henry Eddy, for ten years a member of the Renstrom organization, has been appointed district supervisor in the northern California district.

Engineer Primes Sales Force Before Hare's Motors Salon

Philadelphia, Nov. 19—A closed car salon, well attended, has been held during the week at the local Hares Motors headquarters, exhibiting Locomobile and Mercer cars. Among the exhibits are a Locomobile coupe limousine, a Locomobile sedan with body by Brewster; a Mercer coupe, touring limousine, and sports model and other interesting units. The salesrooms are tastefully decorated in harmony with the exhibit. Before the salon, O. E. Hunt, vice president in charge of engineering of Hares Motors, primed the sales force at an informal smoker on the second floor of the building, when he reviewed the fine points of the cars from headlights to rear axle.

A Department of BETTER BUSINESS

Conducted by Ray W. Sherman

THE MOVEMENT HAS BEGUN—

Are You in Line?

Recognizing That Sales Are Ready to Begin, the Industry and Trade Are Beginning a Push for Business

IN this department a few days ago it was stated that things were beginning to loosen and that from now on we might expect to have a constantly increasing business, the increase being in proportion to the effort made to get business.

Since the previous mention of this subject a number of things have happened, each one indicating the forward progress of the movement. We are going BACK TO BUSINESS—and are starting NOW.

The dealer, salesman, garageman or factory who gets into line soonest and begins a strong effort will profit most.

As a strong central point, the National Automobile Chamber of Commerce has taken the lead in the manufacturing field. It held a meeting of its directors the other day and recommended concerted action. It believes in the power of advertising and we shall soon see campaigns under way in a variety of publications. In addition, there is to be begun at once a concerted effort by the factories to help the dealers get their sales back to volume. The leaders in the industry believe it can be done, and if they BELIEVE it can be done it WILL be done.

Again—the National Automobile Dealers' Association has stepped into the work. It is helping from many angles. For one thing, Manager Harry G. Moock has sent to all the association secretaries a four-page document, setting forth the necessity for local action.

Local associations should get together at this time. The dealers in every town should consider ways and means for getting the industry back before the public in a strong way. Advertising should be resumed and sales forces should be set at work. Local secretaries can and should aid in this way if they are to measure up to their standard of a real secretary.

The keynote of the N. A. D. A. appeal is: "LET'S GO TO WORK!" And if that is appreciated by those who read it nothing more needs to be said.

Now along comes the H. E. Lesan Advertising Agency with the summary of an investigation it has just completed. The summary has been sent to manufacturers and others, setting forth that the demand for cars still exists and that business can be secured if a strong effort is made.

This agency, which did a very good job and rendered a distinct service, sent telegrams to fifty of the most important newspapers in the country and asked that these papers investigate among buyers of motor cars—NOT among dealers—and find out just what the public thinks.

The verdict was that the car, regardless of what any banker may think, is one of the most essential articles in any community, that the demand for it is still there and that business is going to be had.

ANOTHER man states that 1,000,000 motor cars are ready to be junked and must be replaced within the next few months. Operators of shops and service stations, and used car men, know how true this is. Cars have been run TOO LONG. They should have been sold or overhauled long ago. With this pressure upon the owners of these cars they MUST do something soon. Many of them are now in a mood to buy cars. All they need is a little pushing.

In various cities in the country the most energetic and wide-awake dealers have already begun to get business. One is having a business greater than he had at the same time a year ago. Another, in a big city, has entirely reorganized his sales force and is making ONE THOUSAND SALES CALLS A DAY. He is SELLING CARS AND TRUCKS.

Another dealer held an auction, in the regular auction way, in a small middle western town and sold all his used cars by auction at the curb and got $1500 more for them than he expected.

Some of the factories have called in their dealers and

sold them the idea of GOING AFTER BUSINESS.

One dealer has discharged such salesmen as chose to wait for orders to come in, has replaced them with active selling men taken from a variety of other trades, has reorganized his whole line-up and is SELLING CARS.

All over the country are instances such as these. The industry and trade are beginning to GO TO WORK. It has been proven that WORK can sell cars and trucks and everything else, and with the movement already under way there is only one prediction—and it is safe—and that prediction is that the rest of the trade and industry will soon join the procession, and that those who are soonest at work will profit most.

SELLING HAS BEGUN. LET'S ALL SELL.

Creating Interest in the Window Display

A rather unusual showroom and window display of an Auburn automobile made by C. H. Lines, dealer in Fort Wayne, Ind., has been attracting considerable attention lately. Mr. Lines has placed in his show window a new model of the Auburn and from various parts of the car, ribbons have been drawn to the window and pasted to the backs of cards attached to the window. On these points appear snappy sentences telling of the particular sales feature of the car to which the ribbon is attached.

For instance, one of the ribbons is attached to the upholstery and a short sales talk bearing the title of "Luxury" tells about the car's upholstery. Another ribbon attached to the engine calls attention to the sales feature of the engine. Another calls attention to the fact that the car is made near this city and emphasizes just what this means to the purchaser of an Auburn.

In all about ten or twelve sales points are emphasized in this manner and because of the unusual nature of the display, a number of people are constantly stopping to look in the window and it is altogether likely that if it hadn't been for this unusual display they would have passed by the window with hardly a second thought.

How Do You Buy?

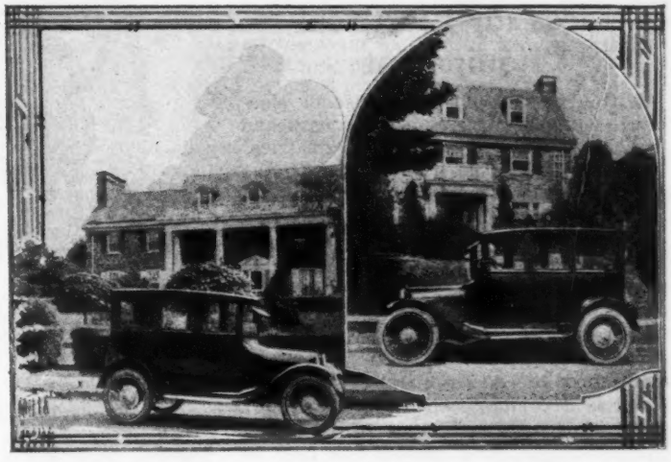
"How can I sell more supplies?" is too often the question uppermost in the minds of dealers and garage owners.

What is more important is to be certain that you buy goods that offer the greatest possibilities for ready and frequent sale, rather than to buy merely to satisfy the occasional individual demand.

The shelves of too many dealers are crowded with stuff bought because of a single demand—and additional demands never came.

The successful accessory dealer is keen on new and timely articles. He studies his prospects, observes their cars as to performance and appearance.

Watch your dealer business magazines. Buy intelligently. Display your stock cleverly and attractively. Watch your stock, see that it keeps moving. If necessary make up bargain lists to move it. Advertise consistently in your local newspapers.—L. G. Willcox.



The Thornton-Fuller Automobile Co., Philadelphia, is making photographs like these by the dozens. (See why in the story on this page.) It may be only a coincidence, but this dealer is also after the factory constantly for more sedans

This Idea Sells More Oil

"How is the oil in your crankcase? When did you change it last? What kind of oil are you using?" are questions asked by Rockwood & O'Connor, Hartford, Conn., operators of one of the largest filling stations in the city. The customer drives up for gas and like as not he is a busy individual who does not bother about the oil. "We will flush out the crankcase in a few minutes and charge you only for the new oil we have to put back" say the filling station men. The customer is impressed. He is willing to be shown and before his eyes the old oil is removed, the case flushed with kerosene and the new oil put in.

The Psychology of Ownership Making Sales

Imagine what the effect would be on you, if a young man called at your home, left an attractive photograph of a fine car standing in front of your house, and took his leave without offering a word of comment. And you looked again and you found not only that it was your house, but apparently your car, although you had only been thinking of buying one and had not yet bought—for there were your initials, neatly, unmistakably lettered on the door. The chances are good that you would step to the telephone, thank the enterprising dealer for the photograph, compliment him on his originality and ask him to send out a salesman to take your order. You can easily produce this same feeling in your prospects. All you need is a good photographer and an artist who can put the initials on the camera plate after the negative has been developed. Twenty-four hours after delivering the photograph to the prospect, you send a salesman and he does the rest.

This plan is used by the Thornton-Fuller Co., Philadelphia, and is good because it has produced results. Use it if you want more closed car business.—Dodge Brothers Magazine.

The Early Bird

Henry Dingman, Overland dealer, West Point, Iowa, lives on a farm, five miles out from this point, but this did not prevent him from selling a large number of automobiles last season. He got right out in the fields after his prospects and sold them cars before the other fellows were on the job. On service he sent his service car right to the car owner's farm whenever they telephoned him they needed assistance and in this way he gave one hundred per cent service and made boosters out of them.

You Have Some Good Ideas, But Are They Working?

One idea in your own mind is one idea. That same idea given to 35,000 other men through the Better Business Department of Motor Age becomes 35,000 ideas.

Ideas help us all. They are the beginning of money-making plans. The smallest good thought may lead to a big result.

Just as you are getting the good ideas of others through this department, give them a chance to get square with you by using one of yours. For the trouble of writing the idea Motor Age will send you ONE DOLLAR, and you have the satisfaction of having done the industry a service.

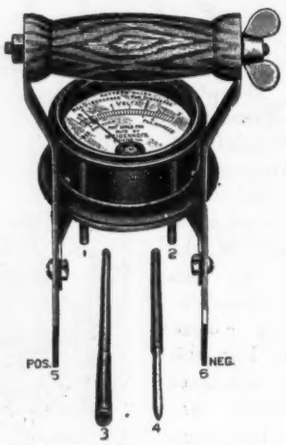
New Equipment at the Show

Jobbers Have Chance to View New Line of Equipment Designed to Speed Up Shop Work

Weidenhoff Testing Devices for Electrical Equipment

With the ever increasing use of electrical equipment on our motor cars and trucks, more and more of electrical trouble seems to be occurring, with the result that there are a number of establishments devoting greater thought to the subject of electrical repair. One firm, Joseph Weidenhoff & Co., Chicago, is placing on the market a number of very useful devices which serve to fill genuine needs in the electrical repairing field. Among some of these devices may be mentioned the testing stand. The test stand is a complete electrical bench for the testing of all manner of electrical equipment. Starting motors are held in a universal vise which will hold any generator or starting motor as well as magnetos.

A torque tester is provided which measures the strength of the turning effort of the starting motor. A convenient dial registers this pull. The motor is secured to the scale by a clamp which is designed for all types of machines. Generators may be tested by measuring the current consumption of the coils and also the output of the generator which is checked against the revolutions per minute made by the generator. The r. p. m. is measured on the techometer scale, which has a range of 0 to 4,000 r. p. m. In driving the generator a ½ hp. motor is provided for the purpose. The motor has a speed range of 0 to 3800 r.p.m. which is controlled from the instrument panel where a reverse is also provided. A direct drive through a chain is provided for the operation of all generators to be tested in this manner. Another device on the table of this bench is an armature mica undercutter, a small power driven motor which is provided with a very fine emery wheel just wide enough to slip in between the segments of the commutator bars. A clamp is provided to hold the armature in the correct position while the mica is being removed.

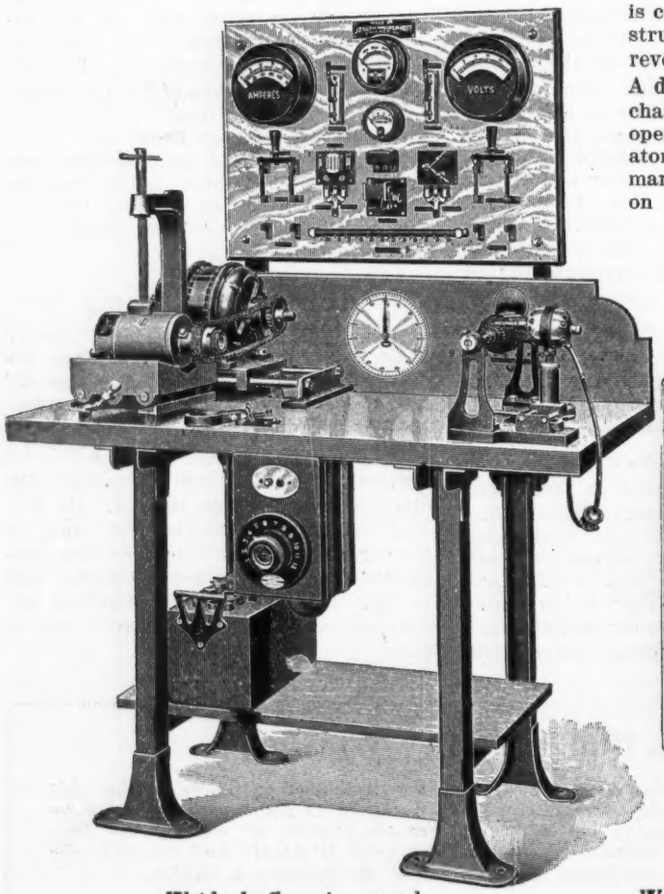


Weidenhoff battery tester

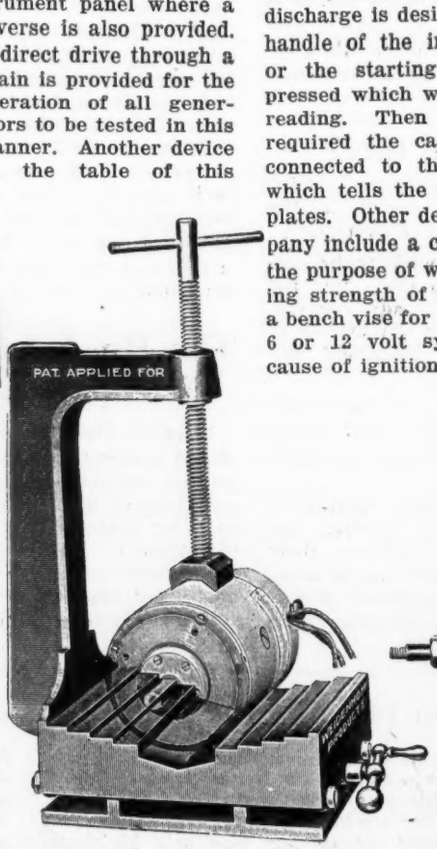
The instrument panel of the test bench is provided with switches to control all the apparatus on the table, as well as a number of other useful devices. These include an ammeter to measure current consumption of the starting motor, voltmeters, vibrators, adjustable spark gaps for testing coils and spark plugs.

Another device made by the same company is a magneto tester for Ford cars. This instrument it is claimed will remove the short circuits from the Ford coils and will also remagnetize the magnets. A battery is connected to the instrument case, which is the source of the current to charge the magnets.

A battery tester is also made by this company, which is designed to serve three persons. The battery may be tested for voltage by merely pressing the pointed ends of the tester against the battery terminals. If a reading under discharge is desired the shunt coil in the handle of the instrument may be used or the starting motor pedal may be pressed which will give a more valuable reading. Then if a cadimium test is required the cadimium test points are connected to the prongs of the tester which tells the condition of the battery plates. Other devices made by this company include a compression spark tester, the purpose of which is to test the sparking strength of the ignition system, and a bench vise for holding armatures either 6 or 12 volt system to determine the cause of ignition troubles.



Weidenhoff testing stand



Weidenhoff test vise

Compression spark tester

Bench Drilling Stand

This stand is designed specially for Black & Decker portable electric drills, taking ⅜ in., ½ in., 9/16 and ⅞ in. drills. These can be easily attached and detached. The bracket carrying drill can be raised or lowered on the vertical column and is secured in any desired position by means of the clamping screw. In the base of this stand are six tapped holes to accommodate half-inch studs, used to clamp the work in place. Both vertical and horizontal adjustments are secured by means of the clamping screw. One stud with nut and clamp is supplied with the stand.

New Service Products

Several new pieces of apparatus have been added to the line of the Service Products Co., Springfield, Ohio. These include a battery post builder, Ford pinion gear puller, piston aligning fixture, engine stand, and an armature test unit. The battery post builder has been designed to meet the requirements of battery service stations for supporting post building molds. The unit clamps the mold firmly and can be furnished with different types of molds and is made in such a manner that most of the standard molds can be fitted into it by service stations.

The Ford pinion gear puller consists of two steel castings with collar pulling them into place and a set screw which turning down on the end of the shaft removes the gear. The collar holding the halves together is octagonal in shape which permits the service station or garagemen to clamp the devise in a wrench or into a vise.

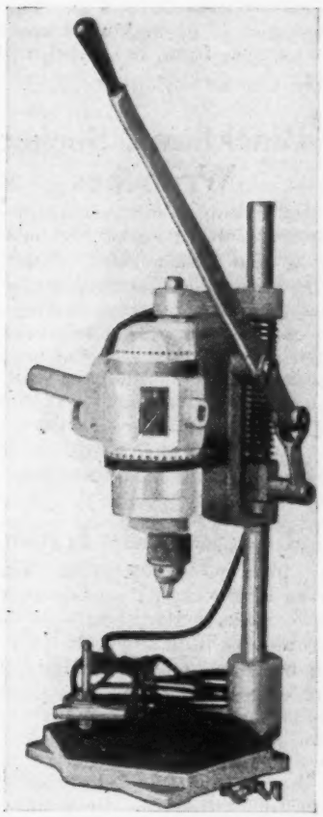
The piston aligning fixture consists of a heavy casting which can be bolted to a bench. This casting is an upright face accurately machined and polished. Extending at right angles to this face is a 1 in. steel arbor which is placed in the base so that it is perfectly square with the face. At the rear is a set of jaws and set screws by means of which the connecting rod can be straightened before it is placed in the fixture for testing the alignment of the rod. Regular equipment includes a 1¼ in. bushing which will fit the model T Ford and by using extra bushings other connecting rods to fit various makes of engines can be tested.

The engine stand is so constructed that practically any type of engine can be handled in it and turned in any position or angle. The engine is clamped in place by a simple locking device. The base is of heavy ribbed cast iron and the column of 3 in. wrought iron. The total height is 41½ in. from the floor and the net weight 175 lb. The base is 27 in. square.

Weidenhoff ignition test set

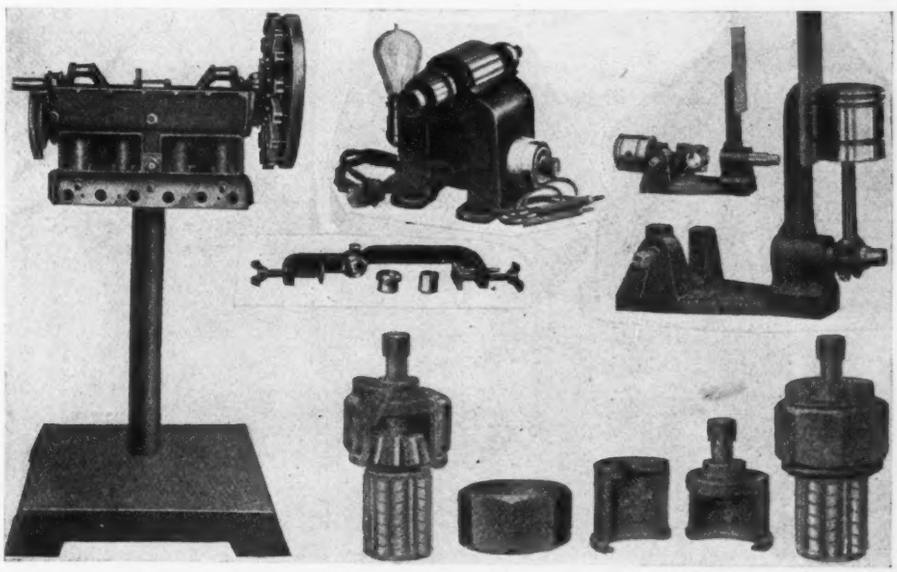
The armature test unit is designed for testing short circuits or open circuits and also grounds in any type of motor or generator armature. The unit is practically universal inasmuch as it will take armatures ranging from 2 to 4¼ in. in diameter. For short circuit testing the unit is connected to a 110 volt alternating current, the armature mounted in the V and slowly turned by hand, at the same time a flat piece of steel is held over the armature and approximately 1/32 in. from it. If there is a short circuit in the winding or commutator, this blade will be attracted to the armature over the slot containing shorted coil.

By marking the slot and tracing connection to the commutator end, the test will indicate whether it is commutator or short within the coil. For ground testing and indicating, a lamp and a set of test points are provided permitting grounds to be located on the armature. Field coils, frames, assemblies and other parts of electrical units can also be tested in the same manner for location of grounds. An attachment plug and 6 ft. of cable are furnished for connecting Model TF-504 to lighting circuit. A snap on the front end disconnects the current from unit coil.



Black and Decker bench drilling stand

Another Weidenhoff product



New Service products

Mid-West Car Wrecker

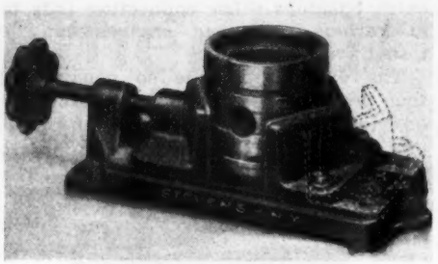
For handling wrecks, the Mid-West Mfg. Co., Minneapolis, Minn., have recently perfected a lifting and towing machine which is built to stand the strain of lifting even the heaviest limousine. It is equipped with powerful gears which, the manufacturers claim, enable one man to handle any car. The projecting crane is used to ream out and lift a motor in or out of a chassis in repair work. This makes it both a useful shop crane and a wrecking device. Its length is 8 ft. 9 in., height 5 ft. 8 in., lifting capacity 4000 lb., and weighs 625 lb. It is equipped with rubber tires 14 by 4 in. The crane extension is 36 in. making it possible to lift a wreck from the most awkward places.

Blackhawk Socket Wrenches

A slight change has been made in the Blackhawk line of socket wrenches. In place of the socket being slipped over the end of the shank and pinned in place, it now is butt-welded, thus making a one-piece construction. This has been done to give more strength to the lower end of the wrench and eliminates the possibility of the socket becoming loose by shearing the pin under severe strain. These wrenches are made by the American Grinder Mfg. Co., Milwaukee.

Truck Body Irons

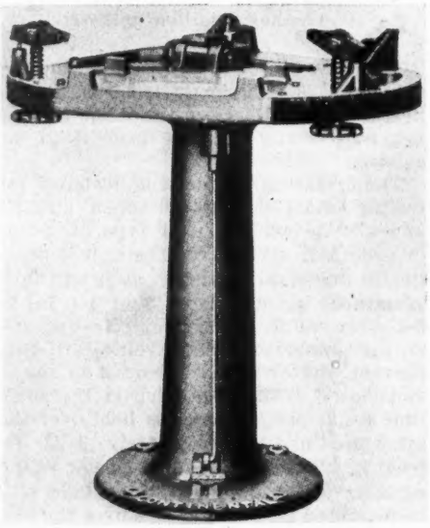
The Bonney Vise & Tool Works is showing for the first time this year a set of body irons, bolts, etc., to enable the car owner to build his own truck body. These irons are made especially for the box type open body to be mounted on a Ford chassis. All that is necessary is to fit the pieces together with the body irons. The only tools necessary consist of a saw, screw-driver, hammer, plane, wrench and bit brace. Only three sizes of bits are required. It requires 30 ft. of lumber to make the body.



Stevens piston vise

Povasco Steering Wheels and Radiator Caps

The Pouvailsmith Corp., Poughkeepsie, New York, has added two new steering wheels to its line. Both are made for Fords and one is called the Ford Tilt, while the other consists of a polished aluminum spider wheel. The Ford Tilt can be swung out of position thus enabling the driver to get in and out of the driving compartment more readily.



Continental Ford assembly table table

New Stevens Products

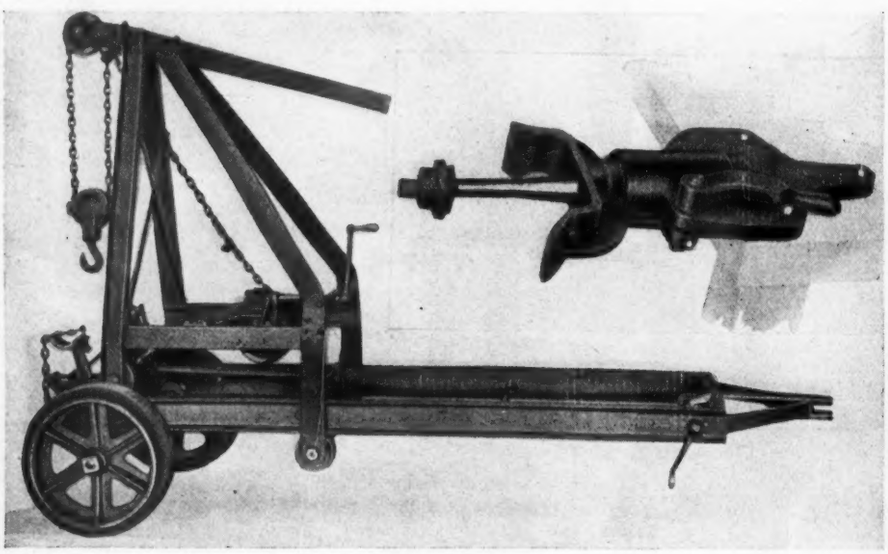
A piston bushing press, and piston vise have been added to the Stevens line of garage equipment. One of the chief features of the bushing press is the expanding block which is placed between the piston pin bosses thus giving a firm support while the pin is being forced out. A plunger 2 and punch 2 align and insert the bushings accurately and smoothly. Essentially the device consists of the expanding block 6, the base 5, yoke 4 and the T-handle screw 3.

The Stevens universal piston valve has four points of contact on the piston. Its jaws are lead lined and in addition there is a bed on which to rest the piston and which is said to enable one to "feel" the pressure which can be regulated to exactly the right degree. The base is 5 by 10½ in. and the jaws 2¼ in. One jaw is movable and the other stationary in two positions. This is to accommodate large and small pistons. The vise lists at $9.50. Both devices are made by the Stevens Co., New York.

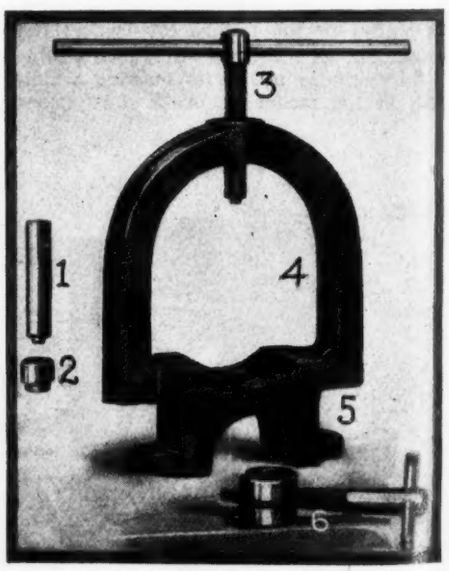
Continental Ford Assembly Table

A new type of overhauling bench for the Ford motor, which is a combination of a set of engine clamps and an assembly table, arranged for the convenient handling of the Ford engine with or without the transmission, is being made by the Continental Auto Parts Co., Columbus, Ind. This stand has a table top which is 32 in. in diameter. The clamps which are integral with the top will permit one to hold the engine either right side up, on the side or inverted.

When the engine is on one side the stand is just a convenient height to facilitate work on the valves. The top is laid out so that two engines may be mounted on it at one time without interfering with the mechanic's work. The table top may be revolved by releasing the foot pedal clutch, making it possible to place the engine in any one of thirty-six positions.



Mid-West car wrecker



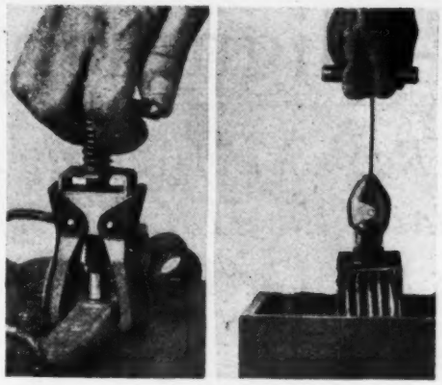
Stevens piston bushing set

Sioux Valve Lathe and Valve Grinding Attachment

The Sioux valve lathe shown in the illustration will reface thirty, forty-five or sixty degree valves from one and three-eighths inches to four and one-half inches in diameter. All of the adjustments are permanently built into the tube. Changing the valve angle is merely a matter of changing the degree plunger from one adjustment stop to another.

One of the outstanding features is the round cutter which it is claimed will cut a smooth face on the valve without chattering or leaving ridges. Another advantage of the round cutter is that it has a long life due to the fact that as soon as one portion becomes dull, the disk can be turned a little and you have a new cutting edge. A swivel center device gives self centering of the up and down center adjustment against the valve. Two clamp devices hold the valve stem from jumping or moving out of alignment. Price complete is $50 and extra cutters can be obtained at $1.50.

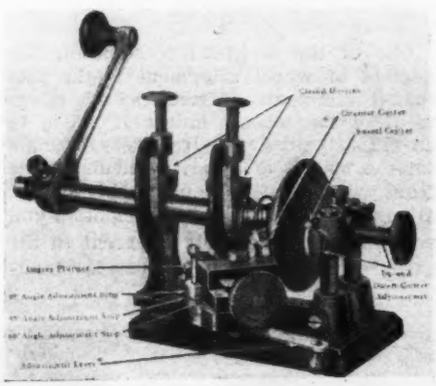
The Sioux valve grinding attachment is a light power driven device that is valuable in any service station. It has two different size shanks, that will accommodate any electric, pneumatic or belt driven device with a chuck that takes a shank ¼ in. or up. It gears down and the shank transforms the direct forward motion into a reciprocating back and forth motion, alternating a full turn forward of the valve on its seat, with a three-quarter turn in the opposite direction. Thus it gradually completes the circle by advancing the valve reciprocally on its seat. The price complete is $30. Both of the above illustrated devices are manufactured by Albertson & Co., Inc., Sioux City, Iowa.



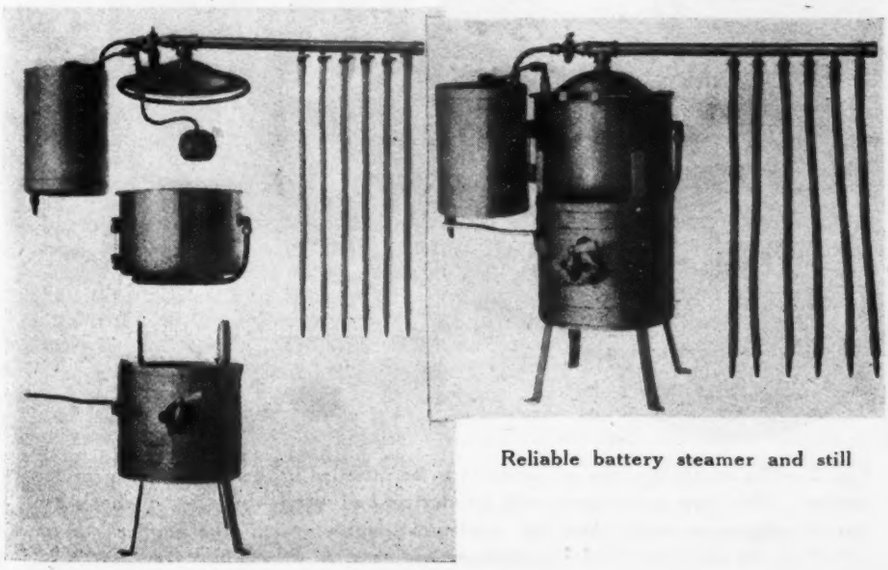
Reliable terminal puller and Reliable cell puller

Roll-A-Car

The Walker Roll-A-Car which has been on the market for some time is now coming through with solid rubber tired wheels in place of the former cast iron wheels. This is the only change in the Walker floor jack and was made in view of the fact that most of the newer sales rooms are fitted with tile floors. With the cast iron wheels considerable noise is produced in shifting the cars around and there is possibility in damaging the floor itself. With the new rubber tired jack these conditions are eliminated. The Walker Roll-A-Car is made by the Walker Mfg. Company, Racine, Wis.



Sioux valve lathe



Reliable battery steamer and still

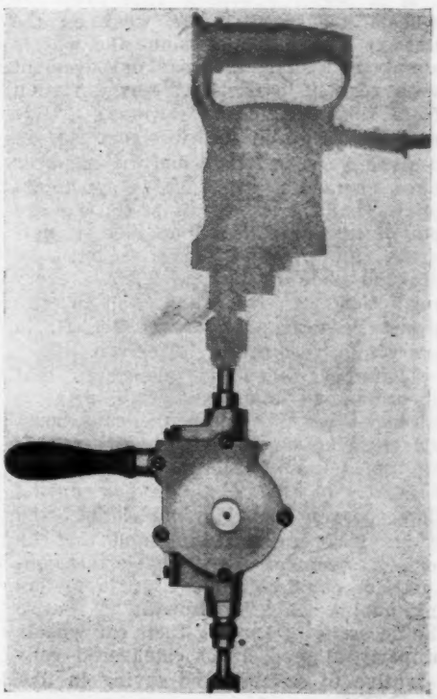
New Reliable Battery Steamer, Cell Puller and Terminal

Several new items have been placed on the market by the Reliable Mfg. Co., Cleveland, Ohio. These consist of a battery steamer and still, cell puller, terminal puller and terminal clip. The battery steamer is made with an instantaneous heating coil, automatic water control, quick detachable locking ring and is made for natural or manufactured gas. The still has a capacity of ½ gal. per hour. It operates from a cold start to maximum output in 3 min. Thirty 6-volt batteries can be steamed in one hour. All internal parts are made of brass and copper.

The cell puller is made of pressed steel with the lower parts of the jaws shaped to fit the cell posts. Attached to the handle is a steel cone which forces the lower end of the jaws tightly around the post when a pull is applied to the handle. Thus, the harder the pull, the harder the jaws grip the post and the element easily can be lifted out of the jar.

The terminal puller is patterned after the lines of an ordinary wheel puller and, in fact, can be used for that purpose. The arms are made of pressed steel and effort is applied by a T-handle and screw. It is applicable to nearly all makes of batteries. It also is useful for removing generator bearings, magneto bearings, starting motor bearings, bushings, sleeves and oil straps.

The terminal clip is made of twisted wire, as shown and has a screw and nut for attaching the cable. One of the salient features of this clip are the two fiber pieces which form not only insulators, but act as handy means for grasping the clip.



Sioux valve grinding attachment

Wheel Mis-Alignment Indicator

An Automatic Recorder of Wheel Mis-Alignment Which Eliminates the Human Element—Operates as the Wheel Passes Over it

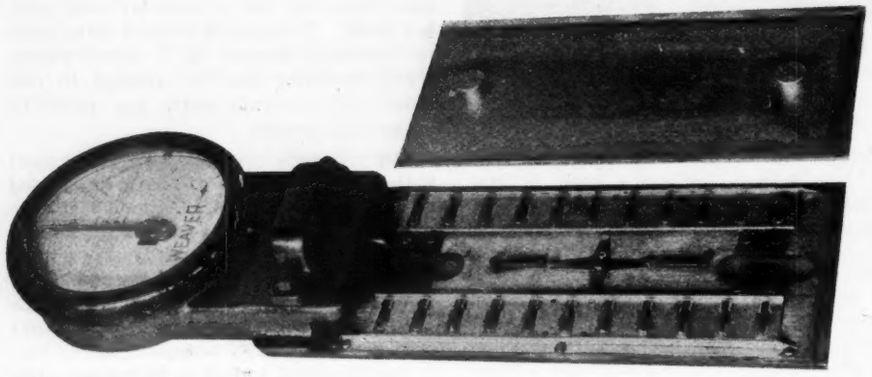


Fig. 1—The portable type of wheel alignment indicator built by the Weaver Mfg. Co. of Springfield. This instrument is designed for use in the shop where the wheels are being adjusted

WHEEL alignment is one of the biggest factors influencing car upkeep. One of the great items of expense is tires. Anyone who has had any experience with motor cars knows that the greatest single factor responsible for unnecessary tire consumption is the mis-alignment of the wheels, both front and rear.

It is perfectly evident that when the wheels are parallel, the wear on the tires is at a minimum since the wheels simply roll along the road or pavement with very little friction. Any deviation from this parallelism, develops a side thrust or drag on the tires that is very destructive especially when driving over hard surface roads. To be more explicit, if the front wheels of the car are out of true alignment one inch, it naturally follows that the tires must be dragged sideways three inches every revolution. At this rate a 30 in. tire would be dragged sideways 168 ft. in every mile that the car is driven.

Therefore, when one considers that according to statistics from fifty to seventy-five per cent of the cars being driven today have their wheels out of alignment to a greater or lesser degree, it is easy to understand what is causing the enormous consumption of tires and it is also easy to understand that by proper alignment of the wheels this consumption could be reduced. If the motoring public could be brought to realize the necessity of keeping their car wheels properly aligned, it is considered conservative to estimate the saving in tire consumption would amount to from ten to twenty per cent.

One of the foremost reasons for the neglect of wheel alignment is the fact that it is difficult to detect the mis-alignment of the wheels unless it exists to an excessive degree. It is very possible for the wheels of a car, particularly the front wheels, to be considerably out of alignment when the car is in motion and yet this fact is scarcely apparent to the casual observer when the car is standing still. This is due to the fact that the play or lost motion resulting from worn steering mechanism, loose wheel bearings, etc., will usually permit the wheels to assume a normal position when standing still. On the other hand, as soon as the car is put into motion all of this lost motion is absorbed and any tendency towards mis-alignment is multiplied by this lost motion. Consequently, when the car is driven, the wheels are very badly out of alignment whereas this fact is not apparent when the car is standing still, even though it may be measured as carefully as possible with a ruler, tram or similar device.

Another phase of the use of the ordinary tram or measuring stick, which represents the only means heretofore of checking up the alignment of wheels, is the fact that it is the usual custom to take the measurement between the fellows of the wheels. This tends to add to the inaccuracy of the result secured in addition to the contingency referred to in the preceding paragraph for the reason that very often the center of the tread of the tire is not mounted evenly with relation to the center of the fello.

When one stops to consider, therefore, the inconvenience as well as the inaccuracy of the methods employed for

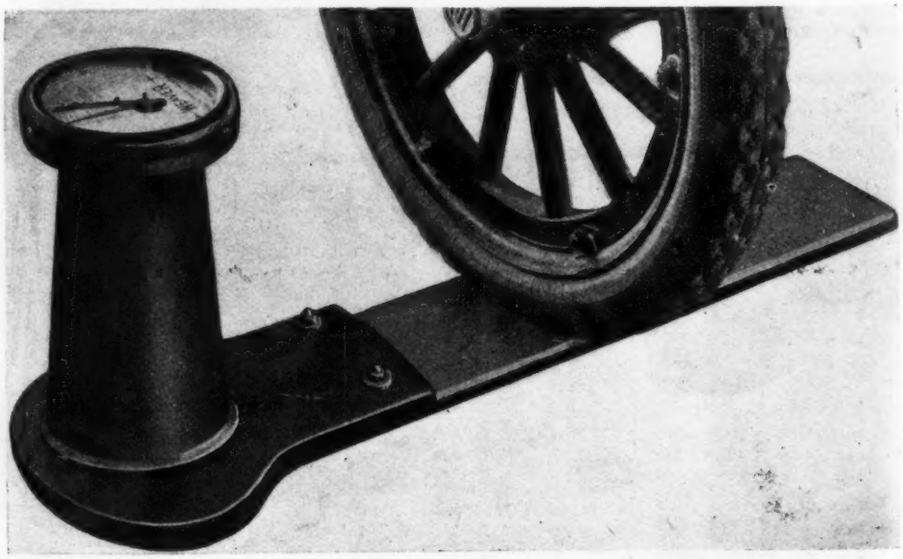


Fig. 2—The stationary type of indicator to be installed in the runway of a service station. This type is equipped with an electric bell which rings if the wheels are out of alignment more than the minimum degree which the service station manager adopts

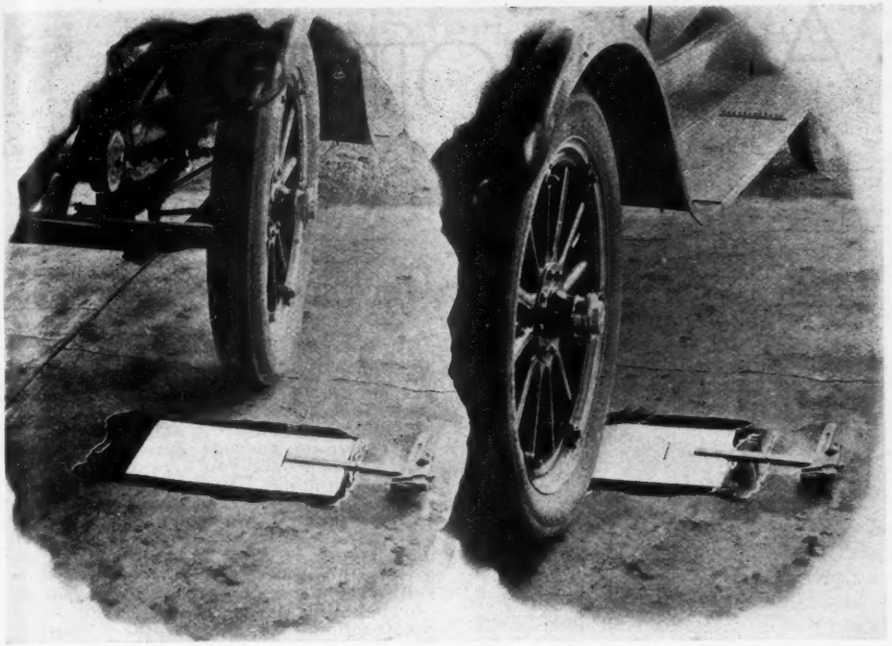


Fig. 3—This illustration represents what happens when a wheel that is out of alignment, and was the experiment which led to the development of the instrument. A piece of card-board was placed on a well greasd spot on a cment floor. Note the position of the line shown at the left before the wheel pass dover the card-board and at the right the position after the wheel has passed over. The difference represents the amount the wheel is out of line

checking up the mis-alignment of the wheels after this may have been suspected by the car owner, it is not so difficult to understand why this all important matter has apparently been neglected in the past.

It is reasonable to expect, however, that the introduction of any instrument which will accurately record the misalignment of the wheels to the minutest fraction of an inch by simply driving one wheel of the car over it, will do much to eliminate this enormous tire waste in the future.

The Weaver Mfg. Co. of Springfield, Ill., has recently placed an indicator on the market that is claimed to accurately record the mis-alignment of the wheels to the minutest fraction of an inch by simply driving one wheel of the car over it. The circumstances which led to the conception of the principle involved in this instrument are of general interest.

The idea was first conceived as a result of the very noticeable difference in the impression left in sandy or oil-coated roads by the wheels of different cars which passed over them. It was found that a car having the wheels in perfect alignment left a clean, evenly balanced impression in the sand or oil, while the car having its wheels more or less out of proper alignment continually pushed the soft surface of the road which was mis-placed by the weight of the tire to the side toward which the wheels inclined.

An experiment consisting of placing a piece of cardboard on a heavily greased spot on a cement road with a mark on the cardboard to indicate the amount of travel as the mis-aligned wheel passed over it, was conducted. It was found that the cardboard was drawn sideways a distance corresponding to the misalignment of the wheels. Fig. 3 shows the result obtained from this experiment. The instrument which is shown in Fig. 1 consists of two flat steel plates with roller bearings between, the upper plate being connected with a recording mechanism which registers the movement of the plate on the dial.

The Weaver Mfg. Co. build two types of alignment indicators, a portable type which is designed for use in the shop in aligning the wheels after the stationary instrument (which is the other type built) has shown that the wheels need attention. Both types, however, are built to give service under the heaviest passenger car or commercial truck.

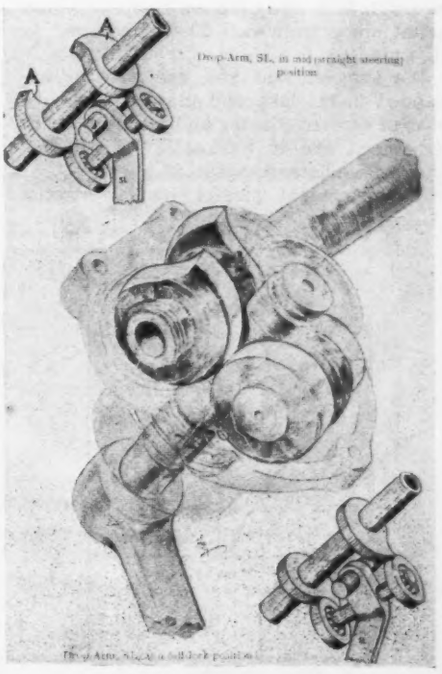
Marles Steering Gear Employs Novel Construction Principle

A VERY peculiar type of steering gear recently placed on the market by an English concern, The Marles Steering Co., Ltd., of London, employs no worm, split nut, or principle similar to anything found in conventional American practice. This gear makes use of a lever arm which is acted on by a cam of increasing diameter, which imparts a movement to the lever through a set of ball bearings. The illustration will explain this peculiar action better than words can portray. One noteworthy feature of the gear is that a complete revolution of the steering wheel will produce a sweep of the road wheels from extreme right to extreme left. The shape of the cams is also proportioned, that the straight ahead position which is the position used for fast driving, gives the maximum leverage between hand wheel and road wheel, and minimum movement for steering in traffic. With reference to the illustration of the steering gear A and A are the two cams which impart a motion to the steering arm equivalent to the rise of the cams. The rise of the cams is multiplied by the ratio of the two lever arms. There is very little friction in this type of gear for what moving parts there are, are carried on ball bearings. The rolling motion of the cams on the ball bearing rollers is practically without friction.

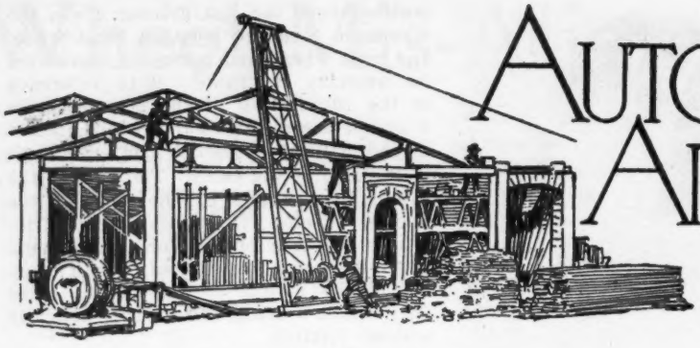
The inventor of this gear, Henry Marles, is making a trip to America the latter part of October with the intention of making new acquaintances amongst the automotive world. During his stay in America, Mr. Marles can be reached at F. S. Smithers & Co., 19 Nassau St., New York.

WHITE BRANCH IN DENVER

Denver, Colo., Nov. 21—The White Co., Cleveland, has established a direct factory branch here. The installation and maintenance service heretofore rendered by the White Auto Co., formerly the Denver dealer of the White company, is being highly developed to meet the requirements not only of Denver but of the entire Rocky Mountain section. C. E. Denzer, former manager of western sales for the White company in Cleveland, will be manager of the sales department of the new branch and Thomas Parramore, manager of the service department. The company has acquired a large and modern building to house the new branch which will serve the territory embracing Utah, Colorado, the north tier counties of New Mexico, Wyoming, the east half of Montana, the Black Hills territory of South Dakota, Nebraska and the three west tier counties of Iowa.



Marles steering gear



AUTOMOTIVE ARCHITECTURE

Planning and Building Problems

CONDUCTED BY TOM WILDER

Corrugated Iron Undesirable for Building Purposes

No. 288

We are doing a good repair business in a small rented building in a town of about five hundred population with the additional trade from an area of twenty-five miles. We have $4000 capital and wish to build a good building 100 by 40 ft. using corrugated iron. We want plans for a stockroom, office and showroom for one car. Would also like your suggestion as to the best roof construction—flat or gable.—Clarence Oswalk, Two Butles, Colo.

The first suggestion we would make is more in the form of a protest against the use of corrugated iron. If you use the galvanized variety it will cost nearly, if not equally as much as anything else and if you use the ordinary black iron it will be a constant expense to you for it must be constantly repainted or it will quickly rust and look run-down and dilapidated.

In addition to this, iron is about the coldest metal in winter and the hottest in summer. Steel is about perfect as a heat conductor and the corrugations increase the surface by about one-third. In other words, a corrugated iron wall 15 ft. long and 10 ft. high would conduct as much heat away from a room as would a flat sheet iron wall 20 ft. long and 10 ft. wide.

We suggest that you use wire or expanded metal lath and plaster it with a coat of cement plaster and barely enough lime to make it workable. When this has set sufficiently give it another coat of clear cement plaster inside between the studding and outside. The last outside coat may be floated smooth or the wall given a finishing coat of pebble dash or any other decorative coat which your mason may suggest. A wall built in this way will be about 2 or 3 in. thick, permanent, strong and fairly warm. Later, if desired, the inside of the studding may be lathed and plastered thus obtaining a good warm building.

The roof should be trussed in some way and the walls reinforced by heavy posts where the trusses rest. Braces as at A should also be used to prevent the wall from tipping or getting out of shape.

Your lot is too narrow to allow a front entrance, and you would do well not to bother with a transient storage if you can get repair work to keep your shop full.

A flat roof should have a pitch of ½ in. to 1 ft., or, in your 100 ft. building, the front should be 4 ft. 2 in. higher than the back. Both flat and gabled roofs are alright. If your property is liable to have buildings close to it on both sides, a flat roof drained to the rear would be the easiest to build.

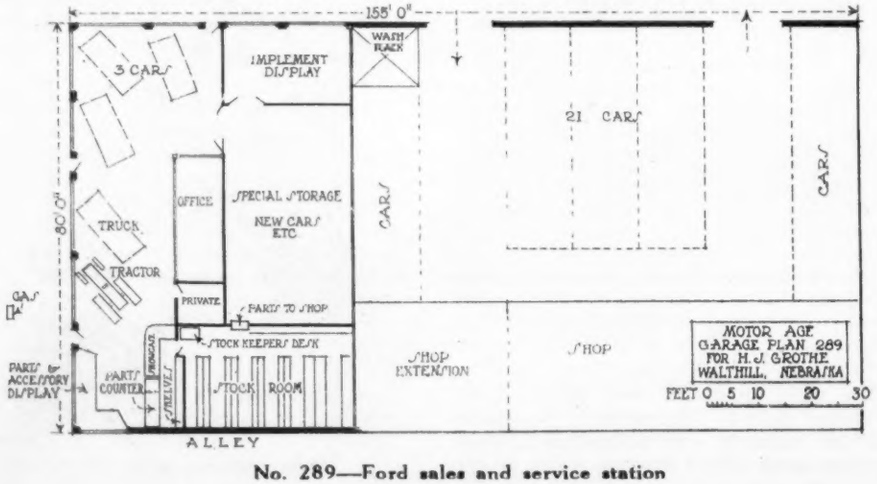
No. 289

SHOWROOM AND OFFICE ARRANGEMENT

We are going to remodel our Ford sales and service station and would appreciate some suggestions from you. We purchased five vacant rooms adjoining our old building which gives us the chance for a main entrance at the front of the building. We want the office, parts room and showroom for new cars on the front side. How would you arrange the front of this building? We want a showroom large enough for three cars, one truck and one tractor. On which corner should we put the office and gasoline pump? We have plenty of room in front so are not giving the dimensions. All we want is your idea as to the front arrangement. Our building is of concrete and brick construction.—Herman Grothe, Walthill, Neb.

You have asked for a layout of the showroom and office only, but we have included an outline of the entire scheme with only the part you requested in detail.

With streets and alleys surrounding your building, there is no good excuse for dividing the front showroom with a driveway. In fact, it is a mistake to have so many driveways. If a customer wants service or wishes to store his car for the day or night, there is no reason why he cannot drive to the side door where he will naturally be taken care of. Why should you sacrifice 700 to 800 sq. ft. of valuable space, part of it frontage, to make a short-cut to the shop and garage?



No. 289—Ford sales and service station

In this department MOTOR AGE aims to assist its readers in their problems of planning, building and equipping service stations, garages, dealers' establishments, shops, filling stations, and in fact any building necessary to automotive activity.

When making requests for assistance please see that we have all the data necessary to an intelligent handling of the job. Among other things, we need such information as follows:

Rough pencil sketch showing size and shape of plot and its relation to streets and alleys.

What departments are to be operated and how large it is expected they will be.

Number of cars on the sales floor.

Number of cars it is expected to garage.

Number of men employed in repair shop.

And how much of an accessory department is anticipated.

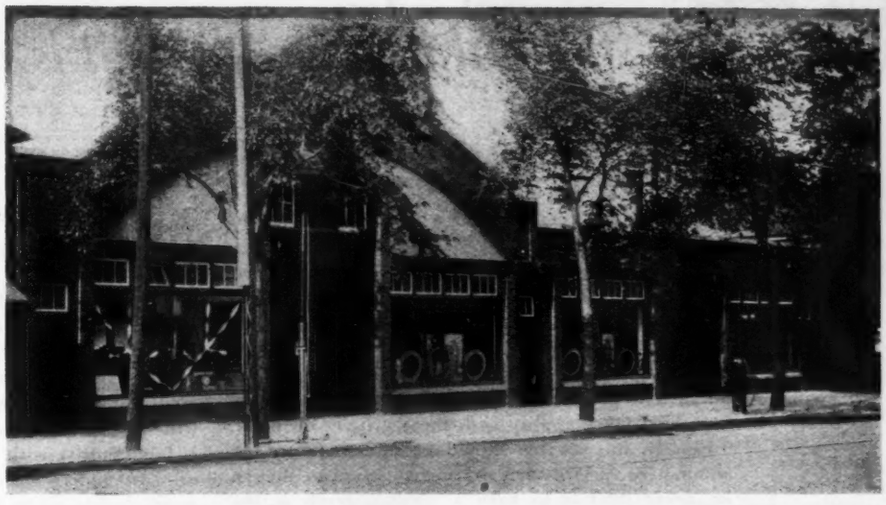
An Attractive Exterior Makes the Car Owner Feel the Service is Good

A NOVEL feature of this garage recently built in Ottawa, Ill., is the stalls for individual car storage. These stalls are divided by means of cement partitions and are arranged toward the entrance door on an angle of about 45 deg. With every stall on a slant or angle, the cars are run in from the street with little or no effort and are backed out in an equally effortless manner, thus saving time, temper, gas and accidents. An arrangement such as this will build up a clientelle of satisfied customers, and this Mr. Hilliard, the owner, has found to be true as he has no difficulty keeping his storage space, which will take care of 105 cars practically filled at all times.

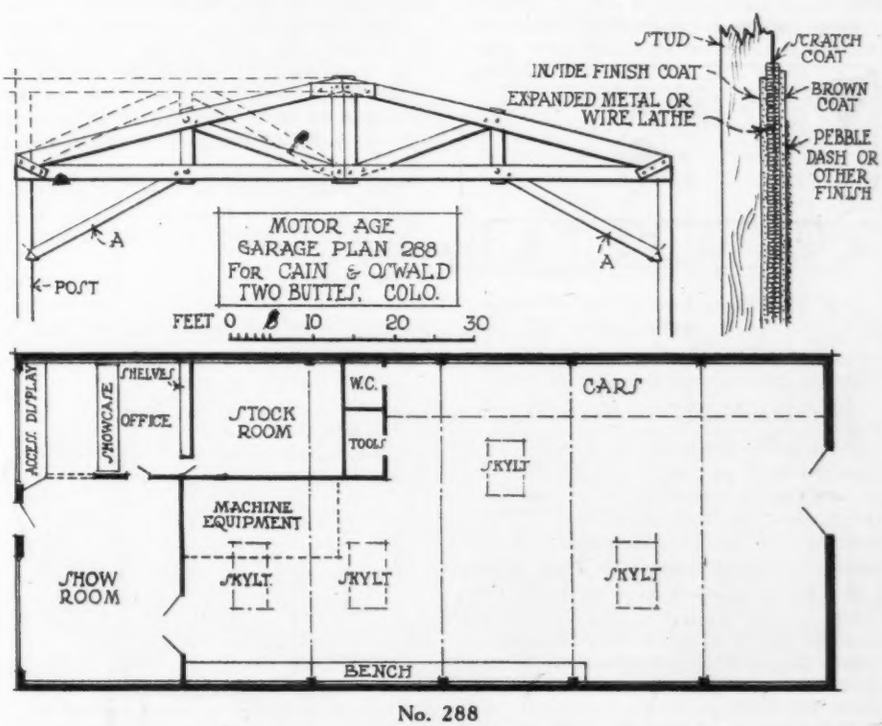
An electric switch is provided in each stall so that when an owner in one of the stalls wishes attention he needs only press the electric button and the drop in the office registers the number of his stall and an attendant is immediately sent to see what is required.

Built of steel construction with concrete walls and floor and an entire glass roof, with not a stick of wood used, the place is absolutely fireproof. To further prevent fire trouble there is a retaining wall between all rooms so that in case of any slight conflagration great steel doors may be instantly dropped thus shutting out all danger. Then running the entire length of the building, taking the place of a roof, is the big glass skylight which makes this building a real daylight garage, giving as it does, sunlight to every part of the garage.

On one side, to the front, is the reception room and like the rest of the garage is finished in white enamel and is furnished with fine rugs, mahogany and wicker furniture. The showroom and office are on the other side with the repair shop in the rear. This is shut off from the garage proper by fireproof steel walls and a drop door and all cars needing attention must approach the shop from the alley.



Showing unusually good window display and the attractive exterior of the Hillard garage



No. 288

SCHROEDER MAKING FLOWMETER

Dayton, Ohio, Nov. 21—Captain R. W. Schroeder, of the Air Service, noted as holder of the world's altitude record for airplanes and pilot of the American Air Service Entry in the Gordon-Bennett airplane race recently, has been discharged from the army.

Captain Schroeder will enter into the manufacture of the Schroeder Flowmeter perfected by him while at McCook Field. He will be associated with a manufacturing concern in Chicago which has undertaken the development and marketing of his device. The unit is a vertical type to be mounted on the dash and reads directly in miles per gallon fuel consumption.

R & V PRODUCING NEW MODEL

East Moline, Ill., Nov. 19—The Root & Van Dervoort Engineering Co., manufacturer of the R & V Knight motor car, has extended the guarantee of prices from Jan. 1 to May 1, 1921. The former date was set immediately upon the development of the unsettled period which followed the announcement of reduced prices by the Ford Motor Co. The company announces that a new four-cylinder model will be ready for distribution early in January. This car will sell for $2,150.

WHAT PACKARD PRODUCED

Detroit, Nov. 15—Interesting facts in connection with Packard production are revealed in a financial statement issued by a Detroit brokerage firm. The statement shows the actual production of Packard cars in 1919 to have been 7040 while truck production amounted to 7305. Since the new Single Six went on the market in August, the report says, 316 had been produced up to and including Oct. 31. Production of 450 during November is anticipated. The company's export business in 1919 according to the statement amounted to 618 passenger cars and 541 trucks, valued at $4,220,757.

Autogenous Welding

What it is and how it is applied

THIS is the nineteenth of a series of articles on autogenous welding. These articles are intended to be of aid to the man who must learn the art of welding with little or no personal instruction. They are also intended as a reference for the man attending a welding school. It is likely that during the first few months of his instruction many problems will come up that may be solved more readily with these articles on hand.

Finally, this service should be of benefit to any automotive service man or repairman, even though he never intends to have a welding torch in the shop. The reading of these articles will give him an understanding of the subject which should greatly aid him in general repair work. He will be better able to decide, when he has a part to repair, whether it is feasible or not to weld it, and if so, if it will pay. The more familiar one becomes with this art, the wider the scope of its application. The man who is versed in the art will find many clever applications that one who is less familiar with the subject would never dream of. An understanding of welding principles offers a new technique to the repair man.

Part XIX—Welding Cylinders

TYPICAL breaks in automobile cylinders are four in number—there are others but these four are the most numerous. They are:

Piece broken out of the water jacket, Fig. 72.

Piece broken off base, Fig. 73.

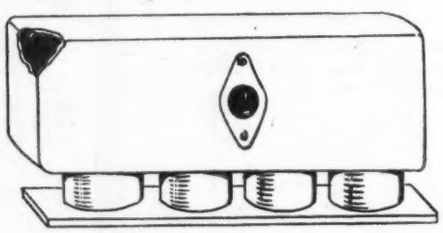


Fig. 72—Piece broken out of water jacket

Crack in water jacket, Fig. 74.

Crack or piece broken out of cylinder, Fig. 75.

Preheating is necessary in every case. Perhaps the best method is to place the casting on the welding table and build the preheating furnace around it. The furnace is constructed loosely of fire brick the lowest courses of brick having 1 in. spaces between to provide draft for the fire. The casting is placed inside the furnace which is filled with charcoal or coke. The top is covered with a sheet of asbestos paper due provision being made for draft.

The furnace should be built so that there is at least 6 in. clearance all around and there must be space enough to allow turning the casting without knocking down the walls of the furnace when it is time to weld.

About three shovels full of charcoal should be put in at first and a little kerosene added before it is lighted. After the charcoal is well ignited more should be added until the casting is half covered. Then a piece of asbestos should be placed over the top with a few holes punched in it to allow for draft.

The casting, Fig. 72, should be allowed to remain until it is brought to a dark red heat when it should be placed in position for welding. Cut a hole in the asbestos so that the point to be welded can be reached through it and without removing the asbestos.

The weld should be done as previous jobs except that a smaller sized head may be used, inasmuch as the casting is already hot.

The casting should not be removed from the fire nor should the fire be permitted to go out while the welding is being done.

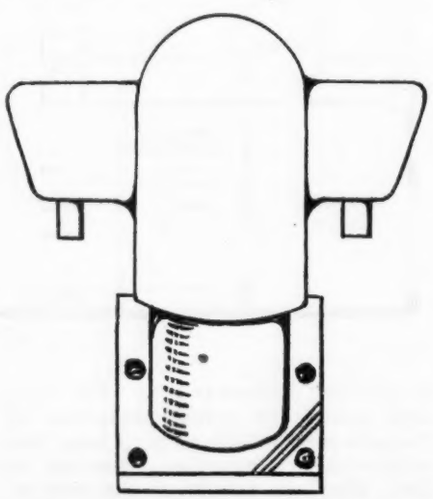


Fig. 73—Piece broken off of base

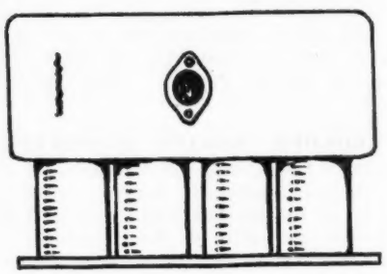


Fig. 74—Crack in water jacket

After welding add more fuel to bring the fire up to an even heat and leave the casting there until the fire burns out. The furnace should be covered with asbestos during the cooling process.

In order to prevent the cylinder bore

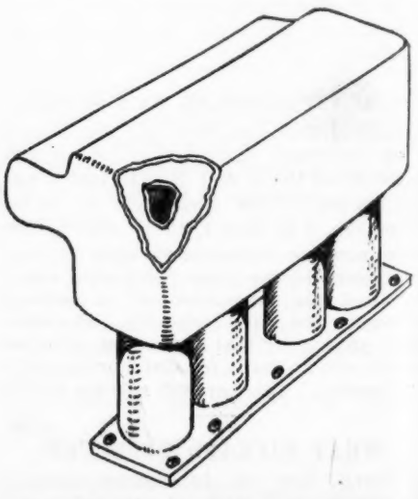


Fig. 75—Crack or piece broken out of cylinder

Fig. 76—Is of interest for several reasons, although the casting itself is a steam cylinder. In the first place, it shows a fire brick pre-heating furnace. In the second place, there is only one break in the casting and, therefore, it is possible to place this break at the top. It is, therefore, not necessary to turn the casting after it is once put in place. For this reason the pre-heating furnace is very little larger than the casting, since room for turning is not required. In order to save fuel a metal pan has been suspended in the bore of the cylinder and the charcoal fire placed on the pan. This is cheaper than filling the whole cylinder bore with charcoal. The V is unusually deep since the casting is thick and yet it is not feasible to weld it from both sides

from scaling it should be given a thin coating of oil which is then dusted with flake graphite.

The break illustrated by Fig. 73 is easy to weld and no further remarks are required. In this case it is only necessary to heat the cylinder to a blue heat.

The crack shown in Fig. 74 is welded in the same way as Fig. 73.

The break shown in Fig. 75 should be treated a little differently. Let us assume that the break is in the cylinder wall and that the water jacket is intact. A portion of the water jacket must be removed in order to reach the cylinder break. This is done by drilling. After the crack has been chipped out the casting is preheated the same as described for Fig. 72. When this weld is finished the piece removed from the water jacket is welded in.

In order to hold such a piece while it is being welded in place it should have a cast iron rod welded to it to serve as a handle. After the job is done the handle may be cut off.

After the cylinder has cooled off it should be tested to determine whether the weld is entirely tight. Where possible water pressure should be used and if this is not available kerosene may be employed. Compressed air is dangerous; if the casting should break under air pressure the flying pieces might cause serious injury.

In case any leaks are found the metal should be chipped out at that point, placed in the fire and rewelded exactly as before.

It is desirable to point out at this point that it is not absolutely necessary to go to the trouble or expense of welding haircracks in waterjackets such as are produced by water freezing in them. Cracks open even as much as the blade of a small knife may be successfully closed by the use of some of the radiator compounds on the market. It is not claimed that all are perfectly satisfactory but it is a fact that some will do all that is claimed for them without any drawbacks.

There are also soft solders with very low melting points which may be used to stop such a leak. They are applied with a soldering iron and the heating effect is so small that preheating is not necessary.

Neither of the methods just described require the removal of the cylinder block from the engine.

Fig. 77—This cylinder repair illustrates a good welding job. The location of the weld has been painted white in order to make it show up prominently

Fig. 78—Give a practical idea of a cylinder welding job. The cylinder head itself was cracked and broken. In order to get at it, therefore, it was necessary to cut out a piece of the water jacket, which was done with a hacksaw. The cylinder head was then welded in the manner described for thin cast iron section. After this job was done the water jacket was put back in place and tacked at four or five points; then it was welded

NEW ENGLAND PLANS MEETINGS

Boston, Nov. 13—Plans were completed during the week for a series of big meetings of motor car dealers throughout Massachusetts and Connecticut in a few weeks. P. E. Chamberlain of Denver, and A. R. Kroh, of Chicago, who have been on a speaking tour for the National Automobile Dealers' Association, will visit this section to make addresses.

President J. H. MacAlman and Secretary Chester I. Campbell of the Boston Automobile Dealers' Association, with Vice President Amos J. Shorey of the National Automobile Dealers' Association are completing the plans. The first meeting will be held here at noon December 2.

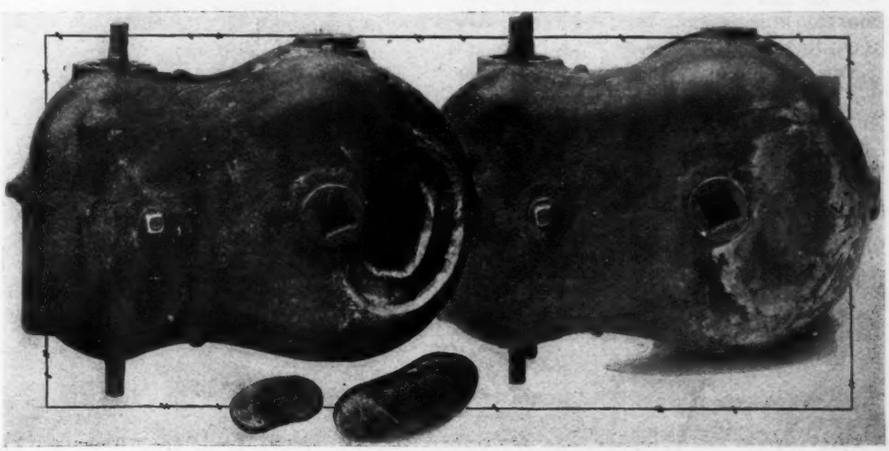


Fig. 79—Shows a cylinder head, welded, before and after. It will be noted that a break has occurred in the cylinder head itself and that it was necessary to saw out a piece of the water jacket in order to get at the break in the head itself. Both holes were V-d out slightly and then the cylinder head piece was put in place and welded. After that the water jacket piece was welded

The Readers' Clearing House
Questions and Answers

Keeping Front Wheels in Alignment

CONDUCTED BY ROY E. BERG
Technical Editor, Motor Age.

THIS department is conducted to assist Dealers, Service Stations, Garagemen and their Mechanics in the solution of their repair and service problems.

In addressing this department readers are requested to give the firm name and address. Also state whether a permanent file of MOTOR AGE is kept, for many times inquiries of an identical nature have been asked by someone else and these are answered by reference to previous issues. MOTOR AGE reserves th eright to answer the query by personal letter or through these columns.

WHEEL alignment is of very great importance and a factor that is neglected in the majority of cases. The alignment of the wheels should be tested at least every 5,000 miles to insure safety and prevent unnecessary wear and tear on the tires. Undoubtedly the biggest factor we deal with in the automotive industry is cost. The first question a customer asks is how much it is going to cost. If the wheels are out of line it will have the effect of dragging and scraping a tire sideways and will cut down the life of the tire a great deal. Testing the wheel alignment is not difficult and requires but a very little time and the equipment necessary can be built at a small cost.

When considering the front wheel there are two principal terms, "camber" and "toe in," which are very often misunderstood. "Camber" means that the front wheels are placed at a 2 deg. angle so that they are closer to each other at the bottom than at the top. The cambering principle brings the point of road contact directly under the center line of the spindle bolt. It makes steering much easier, relieves the strain on the steering-gear, but, of course, places an additional strain on the wheels.

"Toe in" means that the front wheels are closer together at the front than at the rear of the tire when measured at the same height from the ground. When the car is built the wheels are placed in proper alignment. The toe in is about 5/16 in. and the camber 2 deg. which, of course, will make the distance vary according to tire size.

Now when the car is driven there are certain things that happen which cause misalignment of the wheels. Bumping curbs or other objects, shifting of the springs and natural wear of the bearings and steering gear parts all have an effect on the alignment. The question now is, how are we going to check the alignment and make the adjustments?

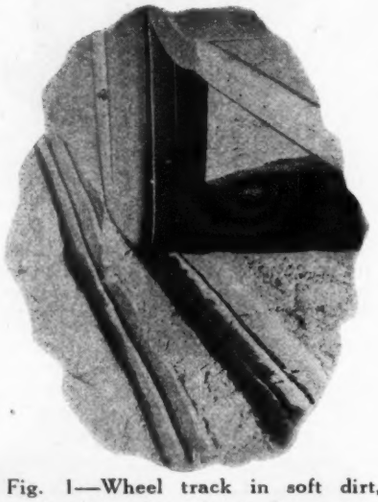


Fig. 1—Wheel track in soft dirt, showing effect of mis-alignment

An easy way to check the alignment is outlined a sfollows: Jack up the front of the car from the center of the axle so that the distance rod or tie rod is not interferred with. With both wheels free to revolve, a center line may be marked on each tire by holding a piece of chalk or a soft pencil against the tire while it is revolving. Next measure the distance between these lines at a point opposite the hubs; turn the wheels half a revolution and measure again. The average distance thus obtained allowing for a slight wabble, should be 5/16 to 3/8 inches less than the distance measured the same way at the rear.

Fig. 1 shows a measuring device that was constructed by one of our readers which can be used to good advantage. The construction of it is as follows:

To adjust the tie rod, it is necessary to remove one of the bolts so that the clamp screw can be loosened and the clevis adjusted by turning on the threads of the tie rod. Any backlash in the axle knuckles and clevises should be taken up by straining the wheels outward in front before setting the tie rod. One of the most important things in connection with alignment is keeping the spring clips tight so that the springs do not shift. Of course, there are many minor factors such as worn bearings, king-pins and shackle bolts that have effect on the alignment and the steering and should be watched as closely as the main measurements necessary to perfect wheel alignment.

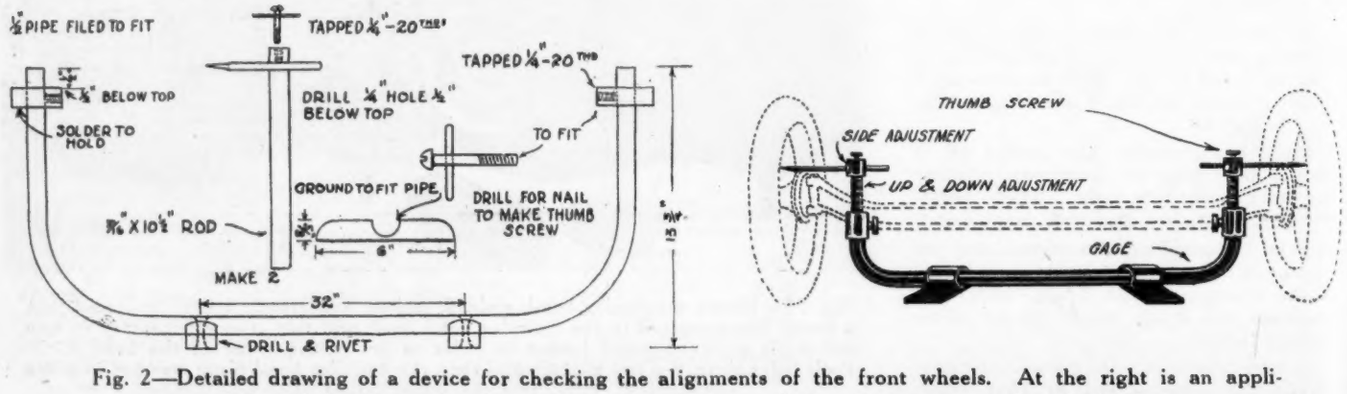


Fig. 2—Detailed drawing of a device for checking the alignments of the front wheels. At the right is an application of this device showing the various points at which adjustment can be obtained

First—Take 6½ ft. of ⅜ in. gas pipe and fill it with fine dry sand to hold the pipe in shape while bending. Put a small piece of waste in the end of the pipe to hold the sand in. To dry the sand good, put two quarts in an open pan and heat over the torch. When the pipe is full of sand put another piece of waste in the top.

An ordinary gas torch is enough to heat the pipe. Bend the pipe so it will be 48 in. on the outside. Heat just the place to be bent, put in a vise and bend quite sharp, but not enough to flatten.

Second—Fasten the standards or braces on the bottom about 32 in. apart. Grind stock to fit pipe, then drill and rivet. Countersink the holes so that rivet head will be flush. The rivets can be made of 3/16 in. rod sawed off about ⅛ in. longer than the thickness of the stock and pipe and headed over. Have the gage sit straight and square with floor. Saw the gage off at the top so it will stand just 13¾ in. This will allow the rod for the up and down adjustment to stand about 14 in. which is low enough for the small wheels.

Third—Take two pieces of 1½ in. pipe, saw off about ¾ in. long and file inside so as to fit over the gage, down about ½ in. from the top. Clean both this collar and the gage and solder so as to hold, then drill and tap on inside ¼ in. 20 ltd. for thumbscrew.

Fourth—To make the thumbscrew take an ordinary ¼ in. 20 ltd. cap screw or stove bolt about 1⅛ in. long, drill hole large enough to take an eight penny nail. Then cut the nail off so it is only 1½ in. long. Make four of these thumbscrews, two for the up and down adjustments and two for the side adjustments.

Fifth—To make the rod for the up and down adjustments take two pieces of 7/16 in. rod 10½ in. long, drill a ¼ in. hole ½ in. from the top and drill and tape ¼ in. 20 ltd. hole in the top for a thumbscrew.

Sixth—The pin for side adjustment is a ¼ in. rod 6 in. long ground or filed to a point. Make two of these.

The method outlined is inaccurate but is better than none. An accurate instrument for detecting misalignment has been developed, however, full description of which appears on page 32.

Where You Will Find the Answer

TO assist readers in obtaining as a unit all information on a certain subject, MOTOR AGE segregates inquiries in this department into divisions of allied nature. Questions pertaining to engines are answered under that head and so on.

Miscellaneous

Fred Cook.....Des Moines
H. R. Moberg.....St. Paul, Minn.
Henry Daley.....Wonewoc, Wis.
Walter Madin.....East Moline, Ill.
W. J. Young.....Rosedale, Kans.
Reader.....Green Bay, Wis.

Electrical Systems

Jos. Humiler.....San Francisco, Calif.
Robert L. Behre.....Daly City, Calif.
C. D. Tribbett.....Miss.
M. C. Overing, Goodell Pratt Co.....Greenfield, Mass.
Charles F. Weitzel.....Pleasant Hill, Mo.
H. R. Koebuick.....Milwaukee
R. R. Freeman, Jr.....Phoenix, Ariz.
Henry How.....San Francisco

Engines

Charles Weitzel.....Pleasant Hill, Mo.
Fred Cook.....Des Moines, Iowa
Winston C. Barker, Cadillac Motor Car Co.....New Bedford, Mass.
T. H. Wall.....Detroit

MISCELLANEOUS

SNOW PLOW

Q—Publish an illustration of a snow plow to be attached to a 3½ ton Packard truck.—H. R. Moberg, St. Paul, Minn.

While this plow is not self-adjusting to unevennesses, it will clear the road of most of the snow, so that not enough will remain in the track to cause any excessive muddiness when warm weather comes around. Its width is only 6 ft., but is sufficient to clear a space wide enough for ordinary traffic. While considerable extra power is required to operate it in 6 or 8 in. of soft snow, it is not believed that this will cause any concern. Any stock car of medium horsepower should propel this plow without difficulty. Of course, heavy, wet snow, drifted badly, would be out of the question.

This snow plow may be put together without difficulty and consists of but few parts. It may be attached to the two front springs or front bumper as desired. The two bolts which secure it to the frame are provided with lock nuts and left loose enough to enable the plow to ride over any unevenness without straining any member. The plow itself is made of fashioned sheet iron and is riveted to a frame of angle iron which rides on three small heavy wheels 4 or 5 in. in diameter.

Cut the two sheets of iron, which should be of quite heavy stock, into lengths of 3½ ft. 20 in. wide. These are curved and cut where they meet in the middle so that when fitted together, they will have a spread of about 6 ft. and will slope slightly to the back at the upper edge.

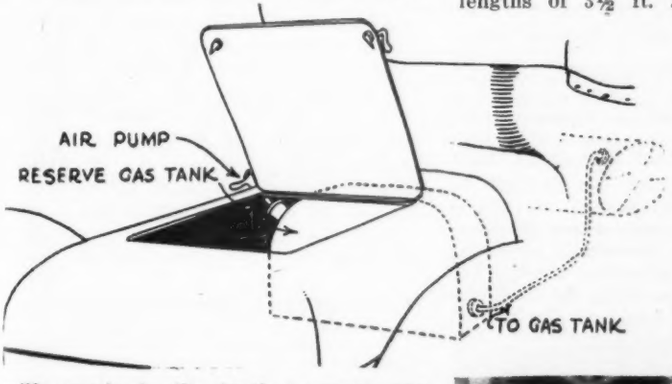


Fig. 3—Showing the installation of an auxiliary gasoline tank in a Ford roadster with hand pump

Make the frame of 1¼ in. width and ¼ in. thick, and bend the two lips toward each other until they are horizontal and at an angle equaling that of the blades of the plow. The frame may simply consist of two V-shaped pieces, when riveted together at the middle, or of only one piece for the top and one for the bottom, if the pieces can be bent at the center satisfactorily. To the lower member, attach pieces of strap iron 8 in. long which have been drilled and bent to the form shown in Fig. 5. These serve as supports for the three wheels.

The wheels should each be of the same size and are bolted to the strap irons as shown in Fig. 5.

Short lengths of angle irons are riveted to the top member of the frame and bent at right angles at the proper distances for attaching to the front of the springs. Heavy iron straps are bent to form over the springs and held in place by a "U" bolt.

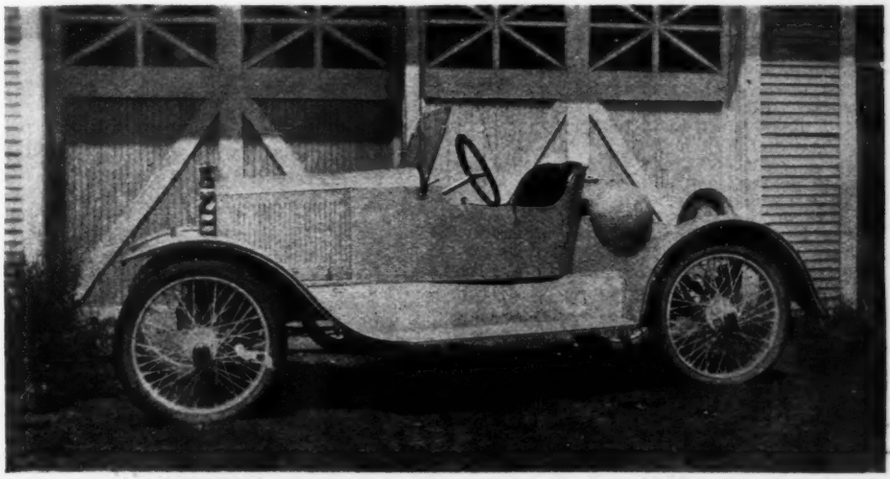


Fig. 4—Ford built by one of our readers. Ford parts and accessories were used mainly in the construction

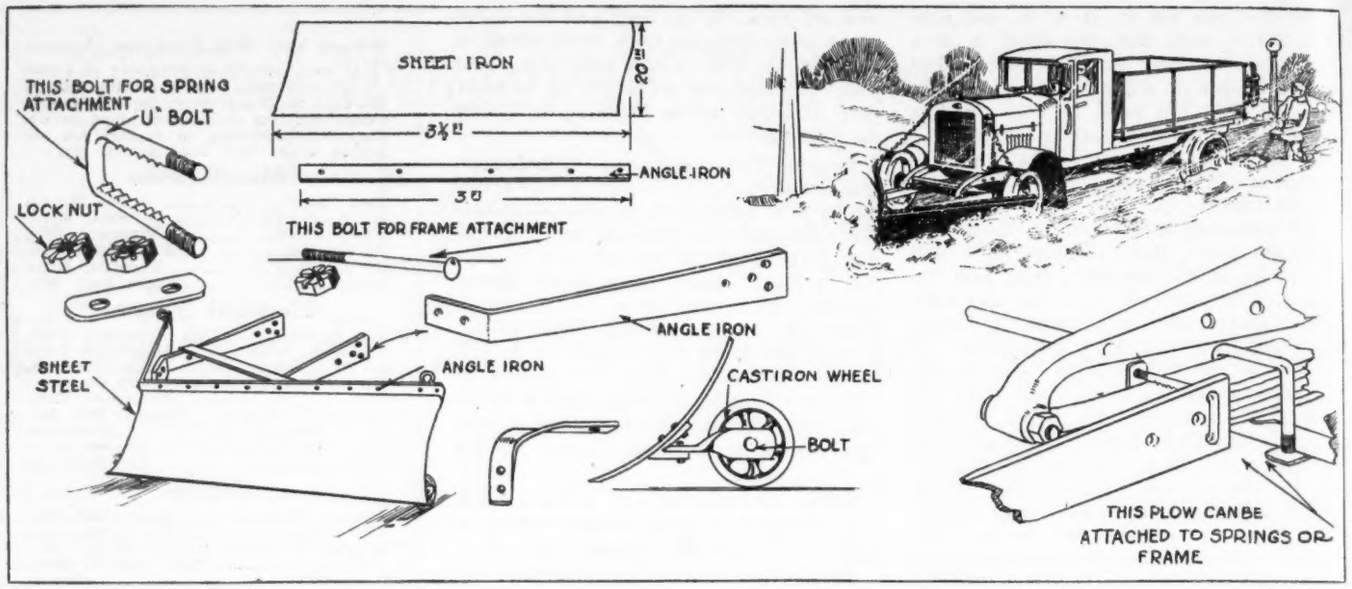


Fig. 5—Snow plow designed for a reader for attachment to 3½ ton truck

A REBUILT FORD

Many inquiries are received in this department relative to the possibilities of rebuilding a Ford either for speed or just to make a special job of it. Fig. 4 shows an illustration of a rebuilt Ford that was built around Ford parts by the C. B. Crook Co. of North Little Rock, Arkansas. A 16 valve Roof head, 1¼ in. Zenith carbureter, Atwater-Kent ignition and the removal of the magnets on the flywheel represent the major mechanical changes.

The radiator designed by the builders is a cellular type, front axle was lowered 3 in. and the frame lengthened and kicked up in the rear 3 in. The rear end is standard Ford throughout except the wheels which are wire wheels. The chassis is the type that will accommodate an electric starter, the body, rear fenders, and windshield are of the builder's design.

This car was not built for speed but it is claimed to be able to make 62 miles per hour. Every visible part is nickeled and all parts are polished where possible. The part that will be particularly interesting to the average mechanic is that it cost $1200 and required 18 months to build.

WOODWARD TRANSMISSION

Q—I have installed a Woodward auxiliary transmission on a Ford.

Ford high	3.63 to 1 direct
Added lower high	6.86 to 1
Regular Ford low	10 to 1
Added lower low	18 to 1

I then installed a 3 to 1 gear ratio in the rear axle. The car used to take the hills in pretty good shape but will hardly make a grade right now. Is the 3 to 1 gear ratio the cause? How much more power have I in lower than I formerly had in high?—Fred Cock, Des Moines, Ia.

By putting 3 to 1 gears in the differential you have increased the speed of the car 21 per cent but at a loss of the same amount of power. With the use of the 3 to 1 gears you now have the following gear ratios:

Regular high	3 to 1
Added lower high	5.67 to 1
Lower low	8.26 to 1
Added lower low	15.61 to 1

The lower high is now 5.67 to 1 where the regular high was formerly 3.63 to 1, or 56 per cent more power in lower high.

AUXILIARY FUEL TANK

Q—Give a suggestion as how to carry a reserve supply of gasoline and oil for emergency's sake on a touring trip with a Ford runabout car.—Henry Daley, Wonewoc, Wis.

A suggestion for the installation of a reserve tank for gasoline is shown in Fig. 3. You will note that a hand pump is provided for pumping the gasoline from one tank into the other. If this auxiliary tank is mounted high enough it is possible to make a connection directly to the main feed line and thus have an auxiliary gravity feed system.

LOOSE FLYWHEEL

Q—Instruct how to tighten the flywheel on model C 37 Buick?—Walter Madin, East Moline, Ill.

It is possible that the bolts have loosened and permitted the flywheel to pound the holes oval shaped. If this is the case the bolts may seem perfectly tight but when the flywheel is revolving it will produce a pounding noise. The remedy is to ream or drill out the holes to the next larger standard size and fit larger bolts to correspond.

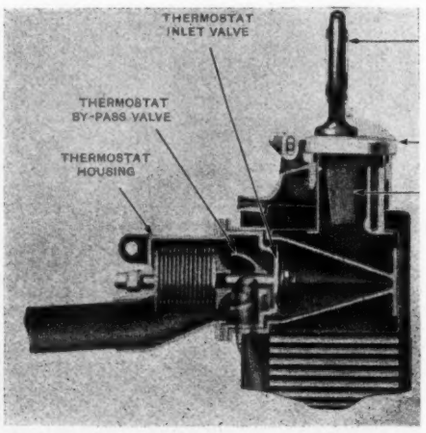


Fig. 6 — Sectional view of Packard thermostat

PACKARD THERMOSTAT

Q—Illustrate and explain the working of the thermostat used in the Packard water circulating system.—W. J. Young, Rosedale, Kans.

The thermostat located in the upper tank of the radiator, by-passes the water to the inlet side of the pump until it has reached the proper temperature to permit efficient running of the motor.

A by-pass tube, Fig. 6, connects the thermostat housing with the inlet side of the water pump. Valves controlling the entrance to the radiator and the by-pass tube are carried on a shaft actuated by the action of the thermostat syphon. Naturally, when the water is cold, the radiator valve is closed and the by-pass inlet valve is open, allowing the water to circulate through the cylinder jackets and back to the pump without entering the radiator. As the water becomes heated the expansion of the sylphon causes the radiator inlet valve to open, and at the same time closes the by-pass valve, making it necessary for all water to circulate through the radiator.

SPIRAL BEVEL GEARS

Q—Are the current models of Stutz cars equipped with spiral cut ring gear and pinion, and could they be used on a 1914 E4 model instead of the straight cut now used?

2—Would it be possible to put a Thermoid Hardy universal joint, or similar one, on a 1914 Stutz?—Reader, Green Bay, Wis.

1—The late model Stutz cars are provided with a spiral bevel set of gears for the final drive. It would not be possible to use spirals in place of straight bevels without a change in bearing construction because of the thrust. Although it is possible to use the new type of gears if thrust bearings are provided yet it would involve considerable expense and we do not believe that it would pay to make the change.

2—This car was provided with a torque tube. However, there is a yoke construction which will permit the installation of one joint of the flexible disk type.

ELECTRICAL SYSTEMS

BIJUR REGULATOR

Q—Publish diagram (internal) of Bijur generator, cutout and regulator.
2—What takes place by changing disconnecting plug from one side to the other?—Jos. Humiler, San Francisco, Calif.

1 and 2—Fig. 7 is an illustration of the regulator box showing the sleeve or receptacle G at one end of the box. This receptacle has the reversible feature incorporated in it. The sleeve receives the plug in which are connected the wires leading to the battery. Inside of the receptacle are two spring plungers which make contact with two contacts mounted within the plug. The disconnecting plug is free to move through a small angle after it is in place in the receptacle. Rotating the plug back and forth reverses the polarity of the voltage across the regulator points.

The diagram of what takes place when the reversal sleeve is moved is shown in Fig. 8. The diagram illustrates the principle of how the current is made to flow first one way across the regulator contacts and then in the reverse direction. It can be seen that in the blades of the switch, shown in the heavy lines, when in the upper position, the current will flow from the field circuit to the upper blade of the switch and then down through the regulator contact.

With the blade of the switch, in the lower position as shown by the dotted lines, the current flows first through the lower blade of the switch and then upward through the regulator contact. It is the purpose of this regulation to equalize the wear on the electrodes of the regulator.

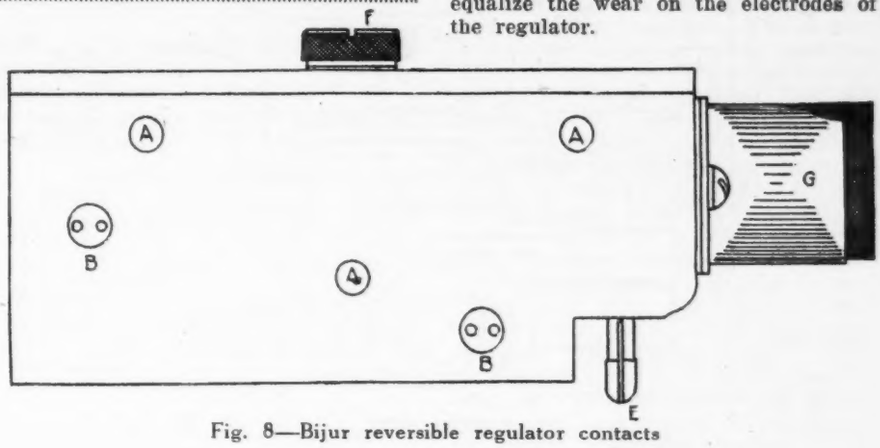


Fig. 8—Bijur reversible regulator contacts

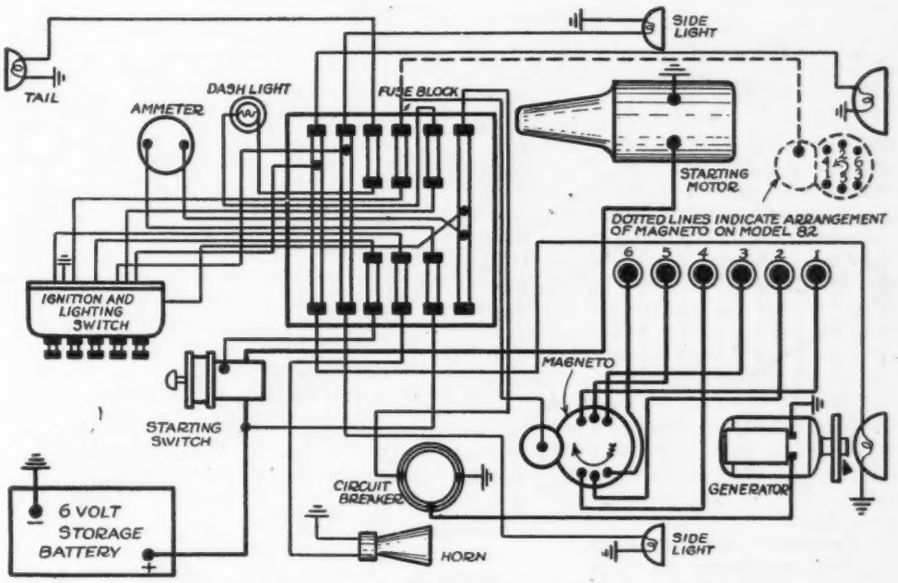


Fig. 9—Overland 1915 "82" and 1916 "86" Autolite system wiring diagram

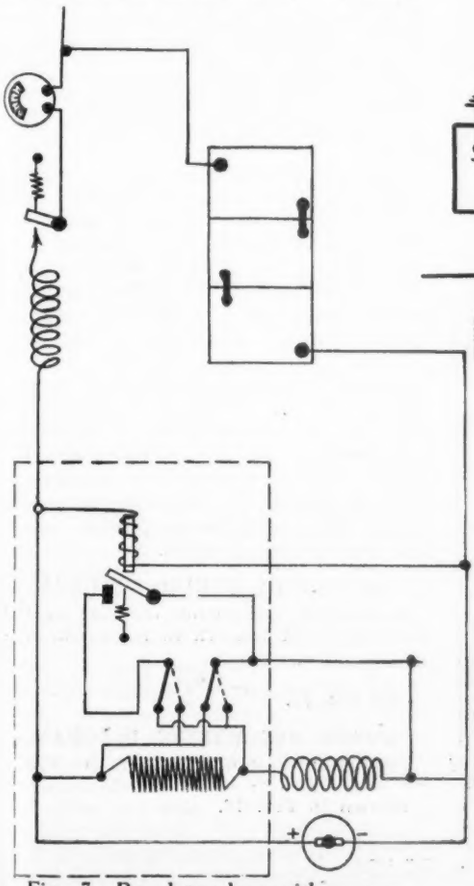


Fig. 7—Regulator box with reversible characteristics

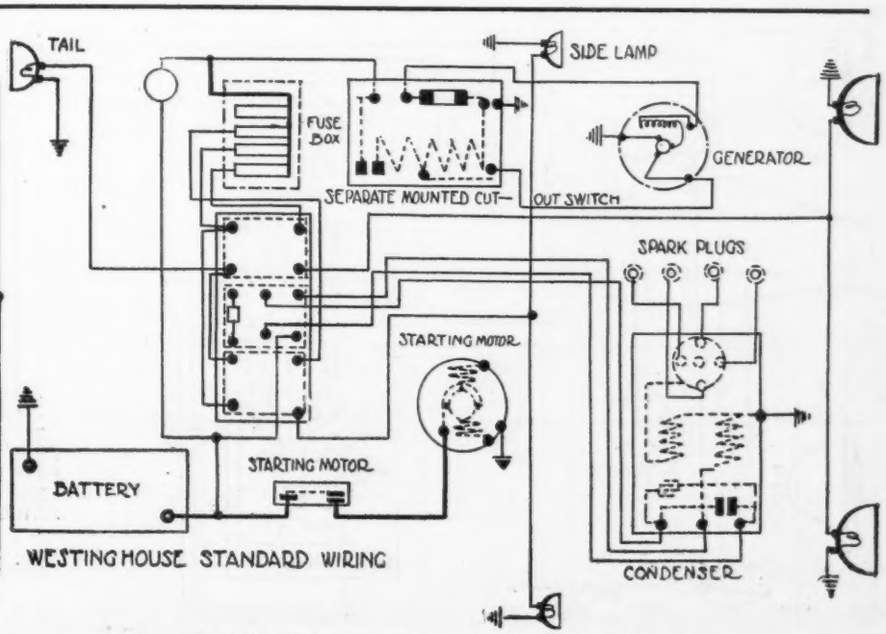
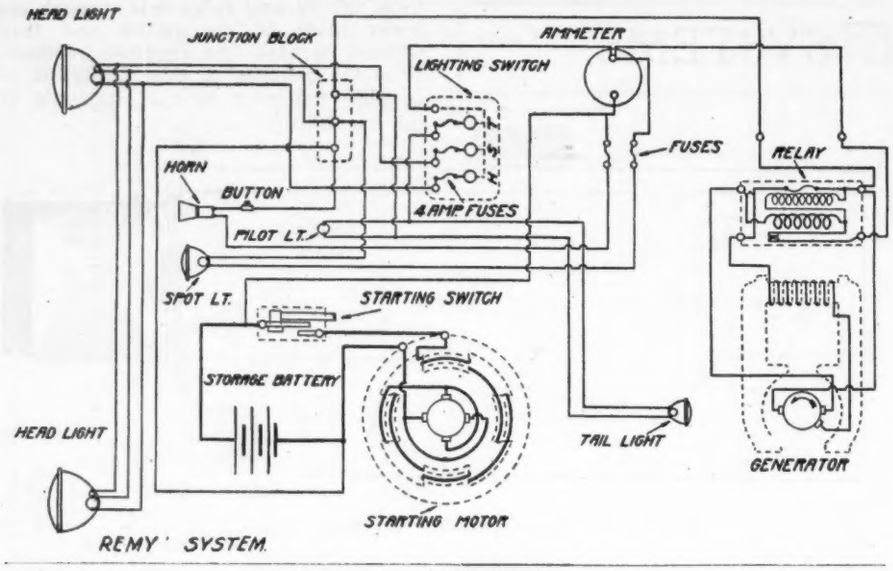
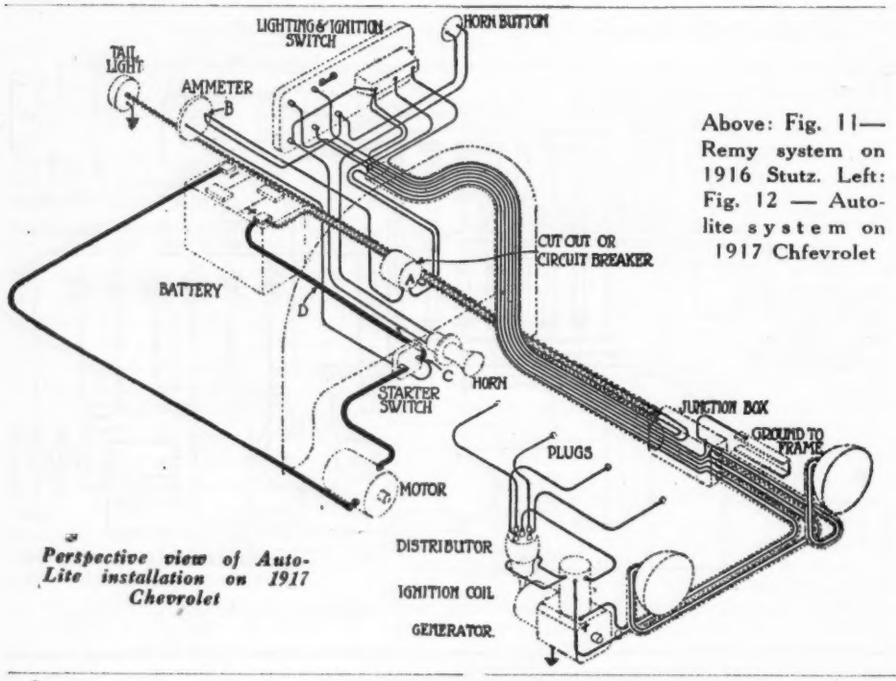


Fig. 10—Westinghouse system on 1915 Briggs-Detroiter





Perspective view of Auto-Lite installation on 1917 Chevrolet

Above: Fig. 11—Remy system on 1916 Stutz. Left: Fig. 12 — Autolite system on 1917 Chfevrolet

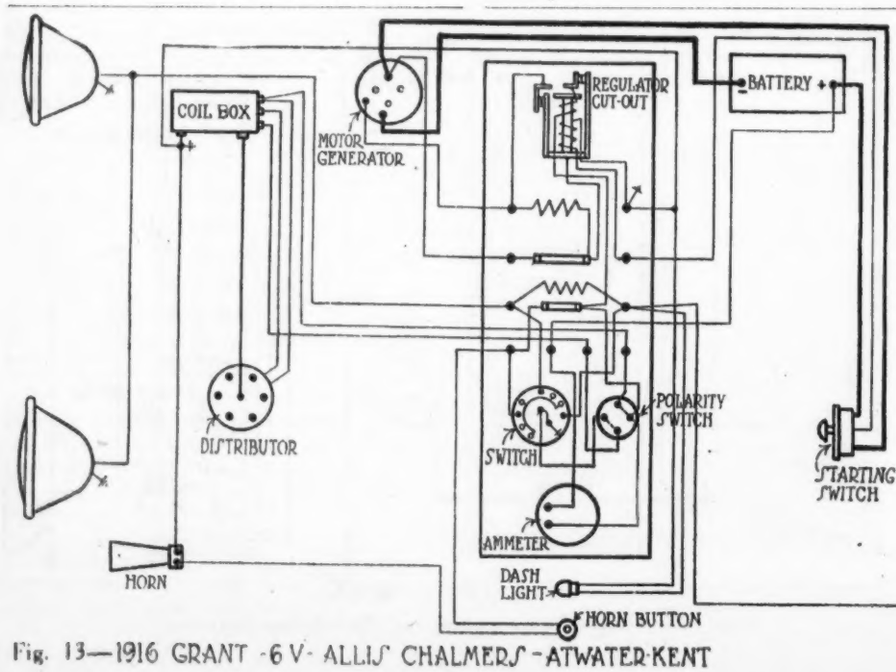


Fig. 13—1916 GRANT -6 V- ALLIS CHALMERS - ATWATER-KENT

Bijur recommends that the regulating sleeve be thrown in the opposite position about once every 500 miles. Shifting of the disconnecting plug in the regulator box from side to side has no effect whatever on the charging current. All types of Bijur generators using the external regulator connections in the shunt field use this type of contact reversal.

DETROITER WIRING DIAGRAM

Q—Publish wiring diagram of the Westinghouse starting and lighting and ignition system, with which the Model "C" 1915 Briggs-Detroiter touring car is equipped. — Robert L. Behre, Daly City, Calif.

Shown in Fig. 10.

STUTZ WIRING DIAGRAM

Q—Publish wiring diagram of Stutz Touring Car, No. 3219 Series 4C.—C. B. Tribbett, Miss.

Shown in Fig. 11.

OVERLAND WIRING DIAGRAM

Q—Publish wiring diagram of the Overland Model 82.—M. C. Overing, Goodell Pratt Company, Greenfield, Mass.

Shown in Fig. 9.

VIBRATING AMMETER

Q—What is the cause of an ammeter vibrating or registering beyond 10 amp on a 1920 Ford at a speed between 15 and 20 m.p.h.? On first starting the car and until the engine warms up the ammeter will vibrate from the ten ampere mark clear over as far as it can go and will not go under unless the speed is reduced. The brushes were sanded in and the commutator slots cleaned out but this remedied the trouble only temporarily. It was thought that the third brush must be jumping or missing connection somewhere causing the increase in amperage but upon examining it the spring seemed to be strong enough to hold the brush onto the commutator and vibrating always stopped after the engine warmed up.—R. R. Freeman, Jr., Phoenix, Ariz.

There may be several reasons for the vibrating of the ammeter on your Ford car. Perhaps the cutout is not functioning as it should. An examination of the cutout points will disclose any faulty condition at this place. Another reason might be that the wire connections from the armature to the commutator bars have become slightly loosened underneath the solder connection in the slot. If this is so the trouble will not be disclosed by a superficial examination, but by prying upon the wire with a screwdriver it can be noticed whether or not these wires are loose. This condition very often causes the trouble you describe.

CHEVROLET WIRING DIAGRAM

Q—Publish the wiring diagram of the 1917 Chevrolet 490.—H. R. Koebuick, Milwaukee, Wis.

See Fig. 12.

GRANT SIX WIRING DIAGRAM

Publish wiring diagram of the Grant Six model V-1916.

Shown in Fig. 13.

ENGINES

ENGINE SPEED

Q—Will a Ford engine stand up under a speed of from 2500 to 3000 resolutions per minute without becoming loosened up or knocking?

2—Where can a worm gear steering attachment be purchased?—Charles F. Weitzel, Pleasant Hill, Mo.

1—It will not and it is very unreasonable to expect that it will. Three thousand r.p.m. is about double the speed that the Ford engine runs when developing its maximum power.

2—Special steering gears for Fords can be purchased from the Craig-Hunt Motor Car Co., Indianapolis, Ind., or the Laurel Motors Corp., Anderson, Ind.

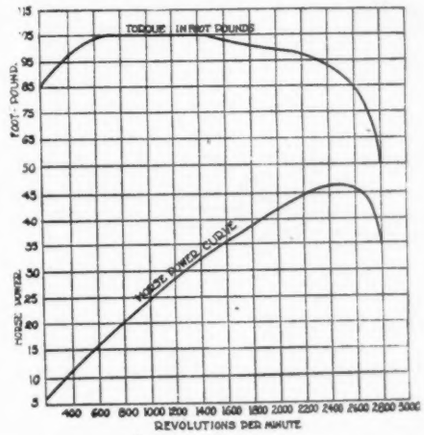


Fig. 14—Power curve of the 1916 Grant Six

POWER CURVES

Q—Publish power curve of the Dodge Brothers car.

2—Publish power curve of the Grant Six model V 1916.

3—What is the meaning of N. A. C. C. horse power?

4—What is the N. A. C. C. hp. of the new Packard six?

5—What speed should be obtained from a Dodge stock car?

6—What speed should be obtained from a Grant stock car?

7—What would be the best way to take end play out of the cam shaft on a Grant Six?

8—How many miles an hour will a Regal make?—Fred Cock, Des Moines, Iowa.

1—Shown in Fig. 15.

2—Shown in Fig. 14.

3—The N. A. C. C. horse power is the rating of the engine's power at 1000 r. p. m. calculated from the formula.

4—The Packard single six is rated at 27.34 hp.

5—The Dodge car will make about 55 miles per hour under average conditions.

6—The Grant will also make about 55 miles per hour under average conditions.

7—The end play is undoubtedly due to worn camshaft bearings. We believe that if the front camshaft bearing is replaced with a new one the trouble will be eliminated.

8—This car will probably make about 50 miles per hour. You no doubt realize that it is impossible to make any positive statements as to the possible maximum speed of a car because of the many factors involved. As a rule the manufacturers do not conduct any tests to determine how fast the car will run and, therefore, it is only a question of guesswork and statements concerning car speed are made without test for proof.

ENGINE EFFICIENCY

Q—I want to convert a 1914 Studebaker six-cylinder engine into other purposes than pulling a car. At what engine speed will this engine show its greatest efficiency?—A. R. Pumphrey, Maunie, Ill.

The greatest fuel economy and efficiency of this engine will be noted at speeds between 800 and 1000 r.p.m.

ENGINE POWER

Q—What estimated per cent of an engine's power is required to turn the accessory shafts, when generator and water pump are run from ft, generator being at full charging rate.

2—How many revolutions per minute are required to run the generator at full charging rate?

3—How many amperes does the starting motor take and how long could the starter be used before the battery was completely discharged?—Winston C. Barker, Cadillac Motor Car Co., New Bedford, Mass.

1—There is considerable difference in opinion on the subject of power consumed by accessories of the engine. An ordinary passenger car engine equipped with a generator, water pump, distributer drive, oil pump, fan, running at its maximum revolutions per minute, would probably develop in the neighborhood of 20 per cent more power with these units all driven from an outside source.

2—The generator ordinarily is developing its full power at 20 miles per hour or with this car the equivalent engine speed would be about 900 r.p.m.

3—Depending upon the weather conditions and the engine conditions the starting motor will take anywhere from 100 to about 600 amperes. The ampere consumption under a locked condition will be about 600 with an ordinary starting motor. At the moment that the starting motor takes hold the current rises very rapidly to approximately 500 amperes and as the starting motor increases the speed of the engine the current gradually drops until about 200 amperes is reached at which point the current remains constant until the engine takes hold and runs under its own power. The writer has witnessed some battery tests which would completely discharge the battery under seven minutes of continuous starting motor operation. This is a condition, of course, that varies largely with the capacity of the battery, the larger the area of the plates the longer will the battery turn the engine over.

DISTINGUISHING KNOCKS

Q—How can you distinguish a loose connecting rod bearing knock from a main bearing knock?—T. H. Wall, 43 Seldon Ave., Detroit, Mich.

The distinction of any type of knock is largely a matter of practice and experience. A main bearing knock will always produce a dull thud similar to a heavy board striking the hard ground. It will occur at every explosion and may be heavier at the explosion of any one cylinder. The connecting rod knock is usually a muffled sound and occurs anywhere from one to four times every two revolutions. If the car owner is not accustomed to hearing the connecting rod knock, it is very easy to confuse with the knock produced by a loose wrist pin or certain kinds of piston slap.

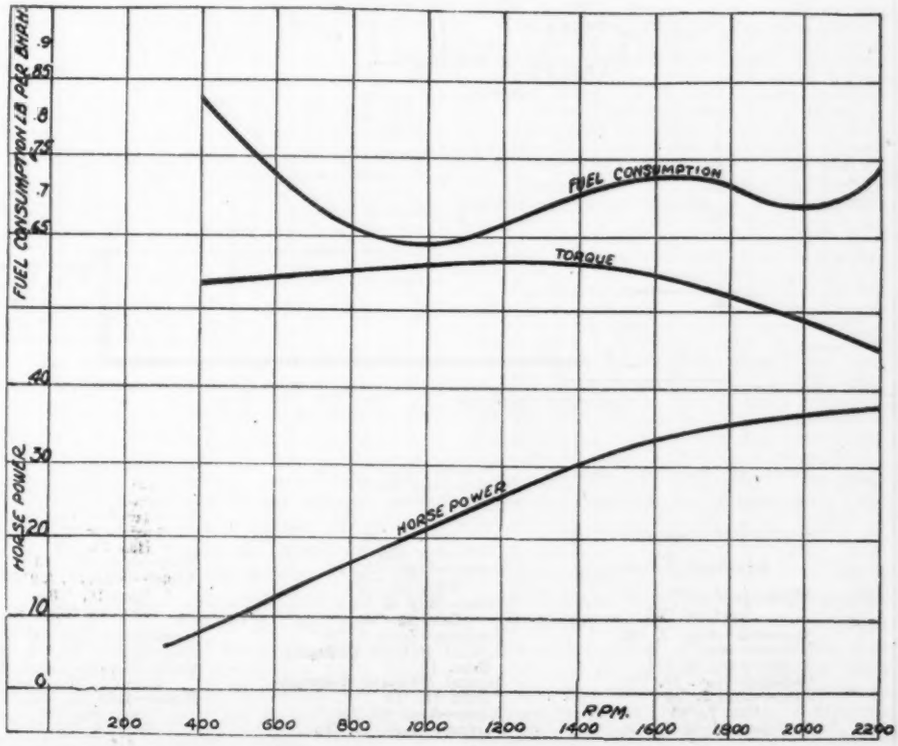
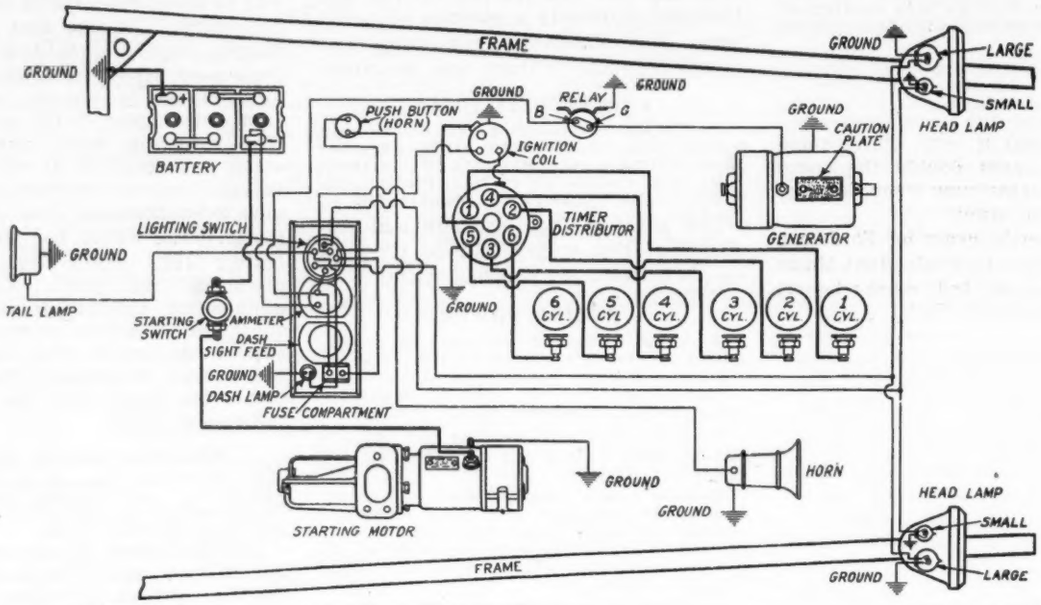


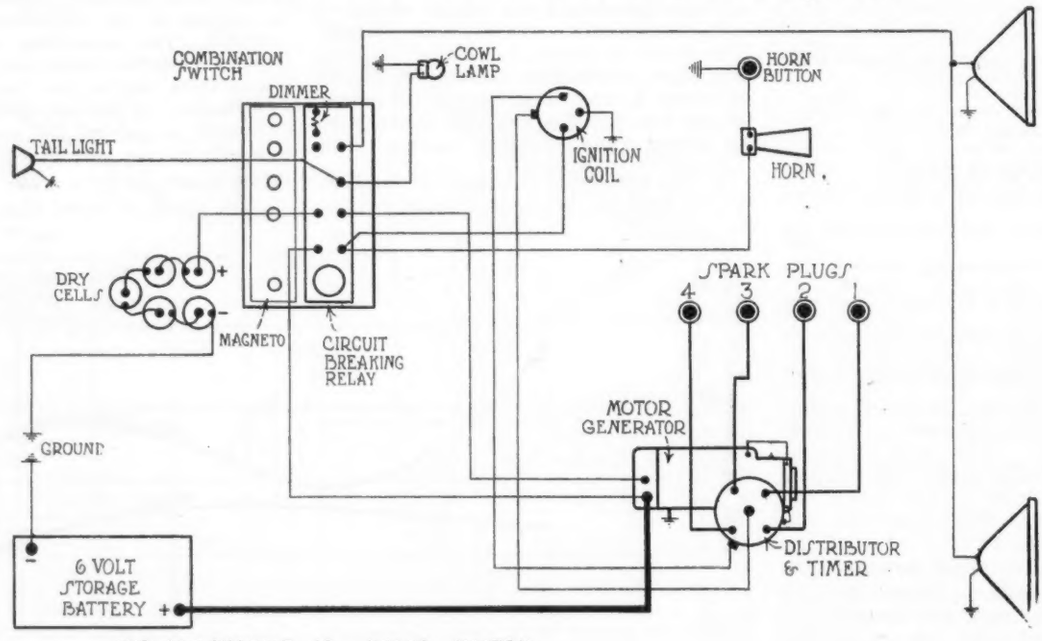
Fig. 15—Horsepower curve of the Dodge Brothers' car

Motor Age Weekly Wiring Chart No. 105

1919 Grant 6 With Wagner Starter & Generator



1915 Oldsmobile 42 With Delco System



1915 OLDSMOBILE 42 DELCO SYSTEM

Name of car and date on which wiring diagrams have appeared in previous issues

Allen—June 17, '20
Sept. 30, '20
Apperson—Aug. 5, '20
Briscoe—May 6, '20
Buick—July 15, '20
Cadillac—Nov. 18, '20
Case—Aug. 5, '20
Oct. 7, '20
Chalmers—June 17, '20
Chandler—May 20, '20
Cole—June 10, '20
Crow-Elkhart—July 29, '20
Davis—Aug. 12, '20
Sept. 2, '20
Dort—Aug. 12, '20
Dodge—Sept. 23, '20
Nov. 11, '20
Elcar—May 6, '20
Oct. 28, '20
Franklin—June 3, '20
General Battery Charging—
Sept. 15, '19
General Magneto Diagram—
June 15, '19
Grant—Aug. 12, '20
Harroun—July 15, '20
Haynes—June 24, '20
Internal Connections—
July 10-17-24, '19
Jeffery—May 13, '20
Jordan—June 10, '20
July 22, '20
King—May 20, '20
Kissel—May 27, '20
Aug. 19, '20
Oct. 21, '20
Lexington—July 29, '20
Locomobile—June 3, '20
Moline-Knight—May 20, '20
July 22, '20, Nov. 4, '20
Moon—July 29, '20
Aug. 19, '20
Sept. 2, '20
Moore—Nov. 11, '20
Oldsmobile—Sept. 16, '20
Packard—Oct. 7, '20
Peerless—May 13, '20
Nov. 18, '20
Pierce-Arrow—July 15, '20
Reo—July 22, '20
Roamer—Aug. 5, '20
Sept. 30, '20
Oct. 21, '20
Saxon—Sept. 9, '20
Scripps-Booth—Aug. 26, '20
Stearns—Nov. 4, '20
Stephens—Sept. 16, '20
Studebaker—July 1, '20
Oct. 28, '20
Stutz—July 8, '20

Law in Your Business

By Wellington Gustin

State Speed Laws Practically Necessitate Use of Speedometers

IN the matter of state laws requiring the carrying of speed indicating devices on automotive vehicles I was once informed that the state of Wisconsin had passed such a law.

I have a matter in hand which makes it imperative for me to be able to furnish definite proof that this is so. I wrote the Secretary of State of Wisconsin but his reply did not give the information I require. If you know of any way in which this could be obtained and could get the proof for me in the form of a copy of the law or an article appearing in the trade papers or newspapers, or anything along that line, it would be of material assistance. Also, if you have any information regarding any action taken by other states along this line, it would be useful.

I expect to be called upon for this information in the very near future and know that you will be glad to make every effort to help me get it.—Van Sicklen Speedometer Company, C. W. Curtis, Pres.

The Wisconsin Legislature in 1919 passed laws covering the speed limits for motor trucks. This statute may be found in "Laws of Wisconsin, 1919," chapter 493. The section reads:

WISCONSIN SPEED LAW

"No vehicle weighing more than three tons and less than six tons, including the weight of vehicle and load, if equipped with pneumatic tires, shall be operated at a speed to exceed twenty miles per hour, and if equipped with two or more solid rubber tires, the speed shall not exceed sixteen miles per hour, including the weight of the vehicle and the load. Shall be operated in excess of sixteen miles per hour if equipped with pneumatic tires or in excess of twelve miles per hour if equipped with two or more solid rubber tires. All vehicles weighing more than three tons, including the weight of vehicle and load, provided with metal tires shall be limited to a speed not to exceed six miles per hour whenever operated, which provision shall apply to trailers having steel tires drawn either by animals or by motor vehicles. The speed limits shall supplement and not replace those specified elsewhere in the statutes."

Further the statute cites the right to enact additional rules and regulations in regard to the size, weight, speed, equipment and loads of vehicles when operated in such cities.

It will be seen the Wisconsin statute does not require in so many words the motor vehicle to carry speedometers. But by regulating the speed, such becomes practically necessary as a matter of protection against the penalty imposed for a violation of the speed limits.

SEEMINGLY knotty legal problems are constantly arising in the dealer's business, which even a slight knowledge of the law easily may solve. MOTOR AGE presents here the most common legal problems which confront the dealer. Mr. Gustin, a member of the Chicago bar, not only is well versed in the law relating to the dealer but presents it in such a way as to be readily understood by the layman. In addition to his articles, Mr. Gustin will gladly answer such individual inquiries on knotty points as may be submitted him.

IF BOTH PARTIES TO AN ACCIDENT ARE NEGLIGIBLE NEITHER MAY RECOVER

One night driving along a road 60 ft. wide on the right hand side of the road and within 12 ft. of the fence, I met two horseback riders, one passing on the right hand side of the road and the other on the left hand side. The horse on the right was followed by a young colt which turned, ran a ways in the direction I was going and then came running back at top speed. I stopped my car but kept on the lights and let the engine run. The colt ran into the car, broke the radiator and lights, and killed itself. Whose suit is it, mine or the owner of the colt?—Black Oak Garage, Black Oak, Ark.

The case you present involves the question of negligence of both parties. In driving your car you are charged with the duty to operate it with the same care of an ordinarily prudent man. The test is that if, under the same circumstances, an ordinarily prudent man would have acted as you did to protect the life of the colt, then you would be relieved of the responsibility for its death. Anything less than that would make you guilty of negligence. As I see it, whether you stopped in time, and whether you should have dimmed your lights are facts that might determine the question of your negligence. Did you act as an ordinarily prudent man in these things? Usually it takes a jury to decide the question.

If you were not guilty of negligence and the owner of the colt was guilty of negligence in respect to such colt, then you have an action against him. There might be negligence shown in the owner's allowing the colt to go upon the highway without a halter or some protection from such possible accidents.

Further, if both were guilty of negligence contributing to the accident then neither may recover. The duty imposed upon each was to act as ordinarily prudent men would act under the same or similar circumstances. If you apply the facts to the rules you may be able to decide as to the action to be taken.

Responsibility for Slanderous Statements

One of my customers sued me for defrauding. He brought his car to me to have new piston rings installed. I had only twelve rings in stock and his car needed sixteen rings, being an Overland 90, so I only charged him for the twelve rings which I put in. The Grand Jury has dropped the case and I have witnesses to prove that the work was done. This case has hurt my business considerably and I want to sue him for $5,000 damage. He claims that no rings were put in and that the car had been run only fifteen miles. My books show that he has had 39 gal. of gasoline. This gasoline was put in the car at my filling station and paid for. The other mechanics who had inspected the car also claim that the rings had not been put in. He demanded I do the work over, free of charge. I refused, and he, accordingly, brought suit. My reason for refusing was that he claimed that the car had only run fifteen miles when on the 17th of June he bought 5 gal. of gasoline, on the 18th 9 gal.—on the 22nd 5 gal.—on the 26th 5 gal.—on July 2nd 5 gal.—and on July 3rd 10 gal., for which I received pay. He also bought from me three quarts of cylinder oil—taken the day the rings were put in.—Wm. S. Nacal, Eunice, La.

One may be held responsible for slanderous statements injuring another's reputation, business, credit, etc. This is known as an action for slander. You may have such a cause, but your facts would indicate you have a better remedy in an action for malicious prosecution. In his claim against you, admitting you did not put in the piston rings, if such was due to mistake on your or your workman's part, there is no intent to defraud, which is necessary to show crime.

Gear Ratios *of* 1920 Trucks

Motor Age Maintenance Data Sheet No. 125

One of a series of weekly pages of information valuable to service men and dealers—save this page

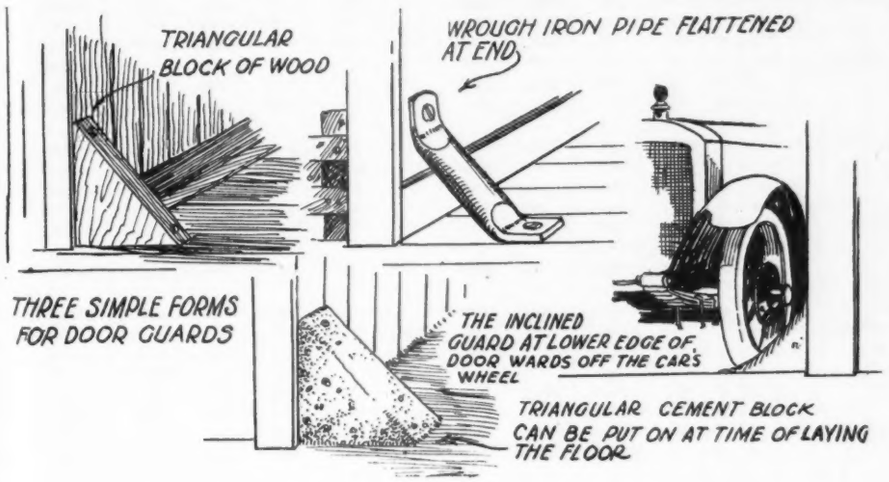
Continued from Last Week

Trade Name	Model	Capacity	1st Speed	2nd Speed	3rd Speed	4th Speed	Reverse	Rear Axle Ratio
Diamond T	O	2	4.75	2.69	1.6	1.	5.94	....
Diamond T	K	3½	5.07	3.04	1.63	1.	6.76	....
Diamond T	EL	5	5.07	3.04	1.63	1.	6.76	....
Diamond T	S	5	4.84	2.84	1.5	1.	5.81	....
Diehl	B	1	3.09	1.85	1.	....	3.87	....
Dodge Bros.	....	½	4.69	1.9	1.	....	4.69	4.166
Dorris	K4	2	4.99	3.16	1.79	1.	5.78	....
Dorris	K7	3½	4.99	3.16	1.79	1.	5.78	10.33
Douglas	GW	1½	2.87	1.75	1.	....	3.12	....
Douglas	H	2	2.82	1.7	1.	....	3.05	....
Douglas	I	3	4.77	2.94	1.61	1.	5.0	....
Duplex	A	1½-2	3.66	1.91	1.	....	4.46	5.5
Duty	20	2	3.65	1.92	1.	....	4.44	8.2
Elmira	C	½	3.6	1.8	1.	....	4.0	6.51
Erie	A	2½	4.8	3.	1.6	1.	6.5	8.7
Fageol	....	2½	10.6	4.3	2.4	7.75	5.4 13.3	....
Fageol	....	3½-4	10.6	4.3	2.4	10.33	5.4 13.3	....
Fageol	....	1½	10.6	4.3	2.4	17.45	5.7 13.2	....
Fageol Med. Duty	....	2½	10.5	4.3	2.4	7.75	5.4 13.2	....
Fageol Heavy Duty	....	3½-4	10.6	4.3	2.4	8.75	5.4 13.3	....
Famous	B10	1	3.	1.7	1.	....	3.5	7.00
Federal	SD	1	3.33	1.82	1.	....	4.04	6.20
Federal	TE	1½	4.40	3.08	1.76	1.	5.28	8.50
Federal	UE	2	4.40	3.08	1.76	1.	5.28	9.25
Federal	WE	3½	4.99	3.16	1.79	1.	5.78	10.33
Federal	XE	5	4.99	3.16	1.79	1.	5.78	13.66
Federal Heavy Duty	WE	9½	4.99	3.16	1.79	1.	5.78	9.25
Federal Light Duty	UE	10	4.40	3.08	1.76	1.	5.28	12.00
Ford	TT	1	2.75	1.	....	....	4.0	7.25
Forschler	AX	1½	3.	1.7	1.	....	3.5	7.80
Forschler	B	2	3.	1.7	1.	....	3.5	8.66
Forschler	BX	3	4.6	2.9	1.6	1.	6.4	8.75
F. W. D.	B	3	4.0	2.	1.	....	4.12	8.90
Fulton	A	....	3.9	1.85	1.	....	3.86	6.8
Fulton	C	2	3.62	1.91	1.	....	4.46	10.20
Garford	25	1¼	4.01	1.76	1.	....	4.32	7.75
Garford	70H	2	4.84	2.84	1.76	1.	5.81	7.75
Garford	77D	3½	4.84	2.84	1.76	1.	5.81	8.75
Garford	68	5	4.	2.33	1.50	1.	6.13	11.44
Gary	I	1½	3.	1.7	1.	....	3.5	7.25
Gary	J	2½	4.8	3.	1.6	1.	6.5	8.50
Gary	KT	3½	4.	2.6	1.5	1.	4.8	10.33
Gary	M	5	4.8	2.8	1.4	1.	5.7	11.66
G. M. C.	16	¾	3.65	1.58	1.	....	4.43	6.00
G. M. C.	31	1½	4.05	2.48	1.58	1.	4.85	9.25
G. M. C.	41	2	4.05	2.48	1.58	1.	4.85	9.25
G. M. C.	71	3½	4.88	2.94	1.54	1.	5.85	12.00
G. M. C.	101	5	4.88	2.94	1.54	1.	5.85	13.67

Continued next week

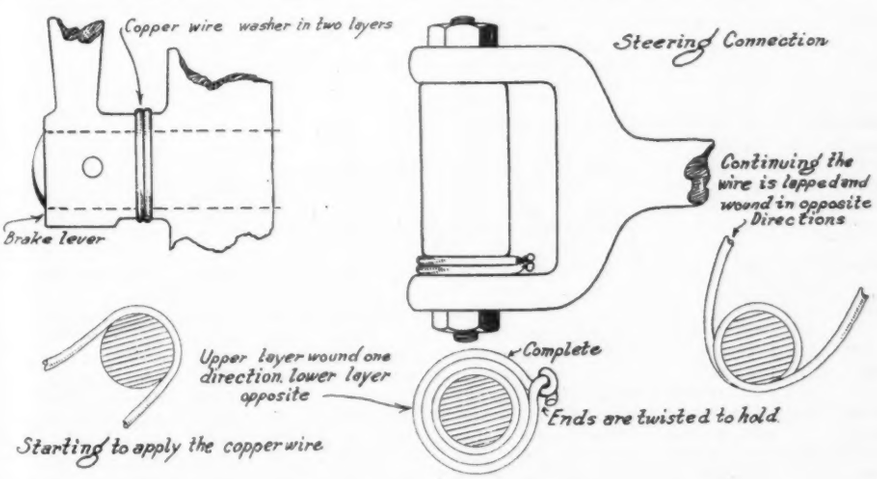
The Automotive Repair Shop

Practical Maintenance Hints


TRIANGULAR BLOCK OF WOOD
WROUGH IRON PIPE FLATTENED AT END
THREE SIMPLE FORMS FOR DOOR GUARDS
THE INCLINED GUARD AT LOWER EDGE OF DOOR WARDS OFF THE CAR'S WHEEL
TRIANGULAR CEMENT BLOCK CAN BE PUT ON AT TIME OF LAYING THE FLOOR

Protected Garage Door and Car Fenders

Door guards are a detail that can be added readily to almost any garage door for the purpose of protecting the door from being broken off the hinges or for the protection that is afforded the customers of the garage. The simplest form of these are inclined slides for warding off the front or rear wheels of the entering car. As is shown in the sketch these guards are readily made of wood, bent wrought iron pipe or more permanently of cement. To illustrate the advantage of door guards, a car driven into a local garage struck the lower edge of a sliding door. The door was knocked off the sliding track and fell upon the side of a car nearby. Additional to the damage to the car one of the rollers was broken requiring a welding job to repair. A pair of guards can be improvised in a few minutes time with the desirability of protecting both cars and doors.


Copper wire washer in two layers
Brake lever
Steering Connection
Continuing the wire is lapped and wound in opposite directions
Upper layer wound one direction, lower layer opposite
Complete
Ends are twisted to hold
Starting to apply the copper wire

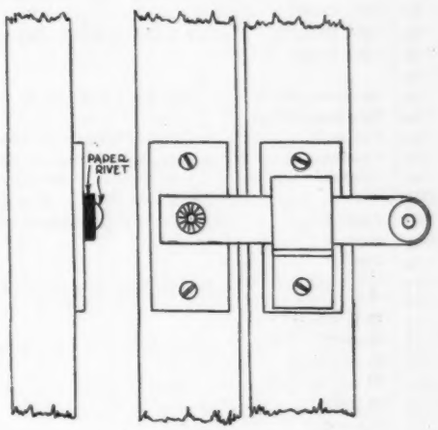
Copper Wire to Remove Lost Motion

In removing lost motion from the chassis parts of the automobile and avoid the annoying rattle it is not always practical to replace each pin, bolt, bracket, etc., on account of the time and expense involved.

A simple expedient in many instances that is used widely in a repair shop of good repute, is to wind several circles of copper wire between the adjacent parts to prevent the end movement. This seemingly is a makeshift. Nevertheless good results that last for a long period are obtained through this method. The copper wire forms a washer when wound over the part, the ends are twisted and cut off and the result is the part does not show and serves its intended purpose making a lasting and inexpensive job.

Help Your Fellow Dealer Save Time

MECHANICAL problems are being solved in repair shops every day. You, perhaps, have devised a time and labor-saving device. Send us a brief description and a sketch showing how it operates. Give your name and address. Motor Age will send you a dollar for every idea accepted and published.



Riveting Kink

Very often it is desirable to cold rivet a piece so that the piece may swivel on the rivet. Innumerable types of latches such as the one illustrated offer a case in point. Frequently when no precautions are taken the rivet head holds the piece so firmly that it is difficult or impossible to turn it. To prevent this difficulty interpose a piece of wrapping paper between the two pieces as shown, rivet the piece and then remove the paper by heating the piece or by working it out.

Linseed Oil and Varnish to Prevent Checking of Paint

The heat from the sun's rays will rapidly dry out the paint of an automobile body and rain will penetrate the paint leaving it streaked and faded, likewise mud will spot it. As a protection from the elements a mixture of linseed oil and varnish applied with a soft rag will shed rain and prevent checking due to sunlight. This will also restore to some extent the original lustre of the paint. Use a mixture consisting of one-tenth varnish and nine-tenths linseed oil.

MOTOR AGE MONTHLY GUIDE TO TRACTORS

Line Number	Tractor and Model	Manufacturer	Drawbar horsepower	Belt horsepower	Number plows recommended	Size separator recommended	Pounds pull drawbar	Weight	Price	Traction	Diameter drive wheels	Make of engine	No. and type of cylinder	Bore and stroke	Normal R. P. M.
1	Allis-Chalmers, 18-30	Allis-Chalmers Mfg. Co., Milwaukee, Wis	18	30	4	30	3000	6000	.....	Wh.	50	Own	4 Ver.	4¾x6½	830
2	Allwork, C	Electric Wheel Co., Quincy, Ill	14	28	3	28	3000	5000	$1,675	Wh.	48	Own	4 Ver.	5 x6	800
3	Appleton	Appleton Mfg. Co., Batavia, Ill	12	20	2-3	22	2000	4900	1 500	Wh.	54	Buda	4 Ver.	4¼x5½	1050
4	Aultman-Taylor	Aultman-Taylor Machinery Co., Mansfield, O.	15	30	4	28	2800	7500	.....	Wh.	70	Clim.	.....	5 x6½	900
5	Aultman-Taylor		22	45	6	32	4800	13000	.....	Wh.	70	Own	4 Hor.	5⅛x8	600
6	Aultman-Taylor		30	60	8-12	.....	8000	23000	.....	Wh.	90	Own	4 Hor.	7 x9	500
7															
8	Automotive, B-B	Automotive Corp. Toledo, O	12	24	2	26	2000	4000	1,785	Wh.	40	Herc.	4 Ver.	4 x5⅛	1000
9	Avery, 8-16		8	16	2-3	22x32	1800	4900	.....	Wh.	50	Own	2 Hor.	5½x6	600-750
10	Avery, 12-25		12	25	3-4	28x30	2800	7500	.....	Wh.	56	Own	2 Hor.	6½x7	600-700
11	Avery, 14-28		14	28	3-4	24x36	3000	7540	.....	Wh.	60	Own	4 Hor.	4⅝x7	700-900
12	Avery, 18-36	Avery Co., Peoria, Ill	18	36	4-5	24x36 / 28x46	3500	9250	.....	Wh.	65	Own	4 Hor.	5½x6	650-750
13															
14	Avery, 25-50		25	50	5-6	28x46 / 32x54	4800	12500	.....	Wh.	69	Own	4 Hor.	6½x7	600-700
15															
16	Avery, 45-65		45	60	8-10	36x60	8600	22000	.....	Wh.	87½	Own	4 Hor.	7¾x8	500-600
17	Blue J	Dart Truck & Trac. Corp., Waterloo, Ia	15	30	3-4	28	2500	4500	2,000	Wh.	42	Buda	4 Ver.	4½x6	1050
18	Boring	Boring Tractor Corp., Rockford, Ill	....	24	2-16	24x36	.....	3600	1,595	Wh.	54	Wauk.	4 Ver.	4⅜x5¼	1000
19	Bull	Bull Tractor Co., Anderson, Ind	12	24	2-3	26	1000	4996	1,200	.....	60	Toro	2 Hor.	5½x7	750
20	Burn-Oil	Burn-Oil Tractor Co., Warren, Ind	15	30	3-4	28x44	3000	5500	1,650	Wh.	56	Own	2 Hor.	6¾x7	700
21	Case, 10-18		10	18	2-3	20x28	1665	3820	1,200	Wh.	42	Own	4 Ver.	3⅞x5	1050
22	Case, 15-27	J. I. Case T. M. Co., Racine, Wis	15	27	3-4	26x46	2500	6460	1,800	Wh.	52	Own	4 Ver.	4½x6	900
23	Case, 22-40		22	40	5	32x54	3760	10300	3,100	Wh.	56	Own	4 Ver.	5½x6¾	850
24															
25	Caterpillar, 5-Ton	Holt Mfg. Co., Peoria, Ill	25	40	4	32x52	3100	9400	.....	Cr.	.....	Own	4 Ver.	4¾x6	1050
26	Caterpillar, 10-Ton		40	60	6	40x60	5000	18800	.....	Cr.	.....	Own	4 Ver.	6½x7	700
27	Cletrac, W	Cleveland Trac. Co., Cleveland, Ohio	12	20	2	24x40	1395	3420	1495	Cr.	.....	Own	4 Ver.	4 x5½	1265
28	Coleman	Coleman Trac. Sales Co., Kansas City, Mo	16	30	3	28x48	3000	5200	1,850	.....	44	Clim.	4 Ver.	5 x6½	750
29	Dakota, 4	Pope Mfg. Co., Watertown, S D	15	27	3	24	2000	5700	1,750	Wh.	42	Doman	4 Ver.	4¾x6	800
30	Dill	Dill Trac. Mfg. Co., Little Rock, Ark	20	....	3	.....	.....	4400	2,480	Wh.	42	Cont.	4 Ver.	4½x5½	900
31	Eagle, F	Eagle Mfg. Co., Appleton, Wis	12	22	2-3	24	2400	5850	1,390	Wh.	48	Own	2 Hor.	7 x8	450
32	Eagle, F		16	30	3-4	28x48	3200	7100	1,850	Wh.	52	Own	2 Hor.	8 x8	450
33	E-B, Q		12	20	3	24	2000	6500	.....	Wh.	60	Own	4 Ver	4¾x5	850
34	E-B, 12-20, AA	Emmerson, Brantingham Co., Rockford, Ill	12	20	3	24	2600	4355	.....	Wh.	54	Own	4 Ver.	4¾x5	900
35	E-P, 16-32		16	32	5	28	3300	9700	.....	Wh.	72	Own	4 Ver.	5¼x7	750
36	E-B, Reeves		40	65	8-10	44	10000	22750	.....	Wh.	90	Spec.	4 Ver.	7¼x9	500
37	Fitch, 4	Four-Drive Trac. Co., Big Rapids, Mich	20	35	3-4	28x30	3200	6000	3,300	Wh.	42	Clim.	4 Ver.	5 x6½	850
38	Flour City, Jr		14	24	3	24	.....	.....	.....	.....	60	Own	4 Ver.	5 x5	800
39	Flour City	Kinnard & Sons Mfg. Co., Minneapolis, Minn	20	35	4-5	28	.....	10000	.....	.....	72	Own	4 Ver.	5¼x6	800
40	Flour City		30	50	6-8	30	.....	14000	.....	.....	84	Own	4 Ver.	6¼x7	550-600
41	Flour City		40	70	8-10	36	.....	21000	.....	.....	96	Own	4 Ver.	7½x9	450-500
42	Fordson	Ford Motor Co., Highland Park, Mich	....	20	2	20x34	1800	2700	850	Wh.	42	Own	4 Ver.	4 x5	1000
43															
44	Franklin Flexible, B	Franklin Trac. Co., Greenville, Ind	15	30	2-3	22x36	2500	3500	1,695	Cr.	None	Erd.	4 Ver.	4¼x6	1000
45	Frick	Frick Co., Waynesboro, Pa	12	24	3	22x26	.....	5800	.....	Wh.	60	Erd.	4 Ver.	4 x6	900-1000
46	Frick		15	28	3-4	26	.....	6000	.....	Wh	60	Beav	4 Ver.	4¾x6	900-1000
47	Full Jewel	Lauson, John Mfg. Co., New Holstein, Wis	15	20	3-4	24x30	3000	6500	2,285	Wh.	54	Beav	4 Ver.	4¾x6	950
48	G-O	General Ordnance Co., Cedar Rapids, Ia	14	28	3	28	.....	4200	1,485	Wh.	46	Wauk.	4 Ver.	4½x5¾	1000
49	Grain Belt, 18-36	Grain Belt Mfg. Co., Fargo, N. D	18	36	4	28x48	.....	8350	2,500	Wh.	60	Wauk.	4 Ver.	4¾x6¾	950
50	Gray	Gray Tractor Co., Minneapolis, Minn	18	36	4	.....	3300	6185	.....	.....	54	Wauk.	4 Ver.	4¾x6¾	850
51	Ground Hog, K	Ground Hog Tractor Co., Holly, Mich	12	20	3	22x36	2150	5000	.....	.....	48	Own	2	6 x7½	600
52	Hart-Parr, 30	Hart-Parr Co., Charles City, Ia	....	30	3	26	3000	5570	1,495	Wh.	52	Own	2 Hor.	6½x7	750
53															
54	Heider, C	Rock Island Plow Co., Rock Island, Ill	12	20	3	24	2000	6000	.....	Wh.	57	Wauk.	4 Ver.	4½x6¾	900
55															
56	Holton, 2-A	Holton Tractor Co., Indianapolis, Ind	10	16	2-12	.....	.....	2500	1,250	Wh.	42	Le Roi	4 Ver	3½x4½	1250
57	Huber, 12-25	Huber Mfg. Co., Marion, Ohio	12	25	3	24x42	2400	5000	.....	Wh.	60	Wauk.	4 Ver.	4½x5¾	1000
58	Illinois	Illinois Tractor Co., Bloomington, Ill	18	30	4	24x28	3500	5200	2,375	Wh.	54	Clim.	4 Ver.	5 x6½	800
59	International	International Harvester Co., Chicago	15	30	4	.....	2500	8990	.....	Wh.	66	Own	4 Hor.	5¼x8	575
60	J. T. N	J. T. Tractor Co., Cleveland, Ohio	16	30	3	30	3200	7600	3,300	Cr.	48	Chief	4 Ver.	4¾x6	1000
61	Kardell Utility	Kardell Trac. & Tr. Co., St. Louis, Mo	12	25	2	24	2000	3600	1,550	Wh.	48	Midw'st	4 Ver.	4½x5¼	1200
62	Keck-Gonnerman, C	Keck Gonnerman Co., Mt. Vernon, Ind	15	30	3	24x40	2500	6500	1,650	Wh.	61	Own	2 Hor.	7¼x8	650
63	Klumb, F	Dubuque Trac. & Tr. Mfg. Co., Dubuque, Ia	16	32	3	28	3200	5250	.....	Wh.	45	Clim.	4 Ver.	5 x6½	800
64	La Crosse, G	La Crosse Trac. Co., La Crosse, Wis	12	24	3	24	2000	4000	995	Wh.	56	Own	2 Hor.	6 x7	900
65	Leader, B		12	24	2	20	2000	5200	.....	.....	48	Own	2 Hor.	6¼x6	800
66	Leader, N	Dayton-Dowd Co., Quincy, Ill	16	32	3-4	28	3500	5800	2,150	Wh.	54	Clim.	4 Ver.	5 x6½	900
67	Leader, C		18	36	3-4	28	4000	6500	2,650	Cr.	.....	Twin	4 Ver.	5 x7½	750
68	Leader, D		20	40	4-5	28	5000	6500	3,150	Cr.	.....	Doman	4 Ver.	6 x7	750
69	Liberty	Liberty Tractor Co., Minneapolis, Minn	18	32	4	30	3380	5900	2,475	Wh.	48	Clim.	4 Ver.	5 x6½	850
70	Magnet, B-14-28	Magnet Tractor Co., Minneapolis, Minn	14	28	3	24	2600	4500	1,850	Wh.	48	Wauk.	4 Ver.	4½x6¼	900
71	Mobile	Mobile Tractor Co., Mobile, Ala	12	24	2	26	2000	3400	1,450	Wh.	40	Herc.	4 Ver.	4 x5⅛	1000
72	Mobile Universal	Moline Plow Co., Moline, Ill	9	18	2	24	2000	3380	.....	Wh.	44	Own	4 Ver.	3½x5	.....
73	Monarch	General Tractors, Inc., Chicago	18	30	4	28	3300	8000	2,700	Cr.	.....	Beav.	4 Ver.	4⅜x6	900

Abbreviations: **Traction**—wh., wheel; Cr., crawler. **Engine**—Beav., Beaver; Veer., Veerac; Herc., Hercules; Wauk., Waukesha; Buff., Buffalo; Asso., Associated Manufacturers; Auto., Automatic Weid., Weidely; Clim., Climax; Twin, Twin City; Cont., Continental; Ruten., Rutenber; Over., Overland; Kenn., Kenneth. **Cylinders**—Ver., vertical; Hor., horizontal; Opp., opposed. **Fuel**—G., gasoline; K., kerosene; D., distillate. **Carburetor**—Ray., Rayfield; King., Kingston; Holl., Holley; Scheb., Schebler; Ben., Bennett; Web., Webster; Zeph., Zephyr; Ens., Ensign; Strom., Stromberg; Till., Tillotson; Zen., Zenith; Car., Carter. **Air-Cleaner**—Donal., Donaldson; Ben., Bennett; Hol., Holley; Par., Parrett; Rain., Rainstrom. **Magneto**—A-K., Atwater-Kent; Sum., Sumter; Eise., Eiseman; Berl., Berling. **Clutch**—B. & B., Borg & Beck; Bier., Bierman; Mun., Muncie; Rock., Rockwood; Spec., special. **Gearset**—B. & S., Brown & Sharpe; Nutt., Nuttail. **Gearset Type**—Sl. G. sliding gear; Se. G., selective gear; Fr., friction; Plan., planetary; Sl. J. C., sliding jaw clutch; Sl. Fr. sliding frame. **Final Drive**—S. G., spur gear; Ch., chain; D. R., double reduction; B G., bull gear. **Drive**—Op., open; Un., inclosed.

AND THEIR TECHNICAL SPECIFICATIONS

Normal R. P. M.	Fuel	Make and size of carburetor	Make of air cleaner	Make of magneto	Make of clutch	Make of gearset	Type of gearset	Make of radiator	Make of bearings in transmission	Make of bearings in front axle	Make of bearings in rear axle	Belt pulley diameter	Belt pulley R. P. M.	Belt speed F. P. M.	Speeds forward	Speed range M. P. H.	Recommended plowing speed	Final drive	Drive	Furrow wheel	Line Number
830	G-K	1½-King.	Ben.	Opt.	Own	Own	Sl. G.	Own	Hyatt	Own	Hyatt	15	830	3200	2	2.3-2.8	2.8	.....	In.	Yes	1
800	K	1½-King.	Ben.	King.	Own	Own	Sl. G.	Perfex	Hyatt	.....	Own	13½	800	3800	3	1⅞-3¾	2½	B. C.	In.	.....	2
1050	G-K	1¼-Scheb.	Ben.	Bosch	B. & B.	Nutt	Sl. G.	Perfex	Hyatt	Own	Hyatt	7½	825	2600	2	2¼-3½	.....	I. G.	.....	Yes	3
900	G-K-D	1⅜-King	Ben.	Eise.	Own	Own	Sl. G.	.....	Hyatt	Own	Hyatt	20	450	2400	1	2.2-2.49	2.5	I. G.	.....	Yes	4
600	G-K-D	1 King.	.....	Eise.	Own	Own	Sl. G.	Own	Own	Own	Own	20	600	3150	.....	1-2.93	2.13	B. G.	.....	No	5
500	G-K-D	2½-King.	.....	Eise.	Own	Own	.....	Own	Own	Own	Own	24	500	3150	2.2	1-2.2	2 2	B. G.	.....	No	6
																					7
1000	G-K	1⅛-King.	Ben.	Eise.	B. & B.	Own	Sl. G.	McCord	Opt.	N. D.	Timk.	10	996	2600	2	2¼-4	2¼	I. G.	In.	Yes	8
600-750	G-K-D	1¼-King.	.....	K-W	Own	Own	Sl. Fr.	Own	.....	Own	Own	17½	600	2750	2	1¾-3	1¾	S. G.	Op.	.....	9
600-700	G-K-D	1½-King.	.....	K-W	Own	Own	Sl. Fr.	Own	.....	Own	Own	19½	600	2910	2	1¾-2¾	1¾	S. G.	Op.	.....	10
700-900	G-K-D	1¼-King.	.....	K-W	Own	Own	Sl. Fr.	Own	.....	.....	Own	16	700	2930	2	2⅛-3½	2	S. G.	Op.	.....	11
650-750	G-K-D	1½-King.	.....	K-W	Own	Own	Sl. Fr.	Own	.....	Own	Own	18	650	3065	2	2-3	2	S. G.	Op.	.....	12
																					13
600-700	G-K-D	2 -King.	.....	K-W	Own	Own	Sl. Fr.	Own	.....	Own	Own	22	600	2880	2	2-3	2	S. G.	Op.	.....	14
																					15
500-600	G-K-D	2 -King.	.....	K-W	Own	Own	C. M.	Own	.....	Own	Own	26	500	3400	2	1¾-2⅔	1¾	S. G.	Op.	.....	16
1050	G	1¼-King.	R. W.	Split.	Delt.	Own	Sel.	Own	Gurney	Timk.	Timk.	12	710	2600	3	1¼-6	2½	D. R.	In.	Yes	17
1000	G-K	1¼-King.	Ben.	King.	Twin	Own	Sl. G.	Perfex	Hyatt	Hyatt	Hyatt	.....	421	.....	2	2-3	2⅔	Ch.	In.	Yes	18
750	G-K-D	1½-King.	Donald.	K-W	.....	.....	.....	.....	.....	.....	Hyatt	12	750	.....	1	2.4-2¾	2 4	B. G.	.....	.....	19
700	K	1½-Scheb.	Ben.	K-W	Own	Own	Sl. G.	Eureka	Hyatt	Own	Own	13	700	2600	2	2-3	3	I. G.	In.	Yes	20
1050	G-K-D	1⅜-King.	Own	Berl.	Own	Own	Sl. G.	Own	Hyatt	Own	Hyatt	14¼	1050	3916	2	2¼-3	3	S. G.	In.	No	21
900	G-K-D	1⅜-King.	Own	Bosch	Own	Own	Sl. G.	Own	Hyatt	Own	Hyatt	16	900	3762	2	2¼-3	3	S. G.	In.	No	22
850	G-K-D	2 -King.	Own	Bosch	Own	Own	Sl. G.	Own	Hyatt / Timk.	Timk.	Hyatt	16½	850	3669	2	2.2-3.2	3.2	S. G.	In.	No	23
																					24
1050	G	1½-Scheb.	Donald.	Eise.	Own	Own	Sl. G.	Modine	Hyatt	Hyatt	Hyatt	12	1012	3150	3	1.5-5.7	3	G.	In.	No	25
700	G	2 -King.	Donald.	K-W	Own	Own	Sl. G.	Own	Hyatt	Hyatt	Hyatt	14	850	3120	3	1.65-4.78	3	G.	In.	No	26
1265	G-K-D	1⅛-King.	B. & B.	Teagle	B. & B.	Own	Sl. G.	McCord	.....	.....	Timk.	8	1265	2500	1	1-3½	3	I. G.	In.	.....	27
750	G-K	1½-Ben.	Ben.	Dixie	Own	Own	Sl. G.	Own	Opt.	Own	Own	14	750	2750	2	2-3	3	Worm	.....	.....	28
800	K	1¼-Linga.	John.	K-W	Bier.	Own	Sl. G.	S-J	Own	Own	Own	14	800	2500	1	3	3	Cn.	.....	Yes	29
900	G	1½-King.	Donald.	Bosch	B. & B.	Cotta	Sl. G.	Eureka	S. K. F.	Hyatt	Hyatt	.....	.....	.....	3	1-5	3	Ch.	.....	.....	30
450	G-K	1½-Scheb.	Own	Dixie	Own	Own	Sl. G.	Perfex	Hyatt	Own	Own	20	450	2350	2-3	1½	2	G.	.....	Yes	31
450	G K	1¾-Scheb.	Own	Dixie	Own	Own	Sl. G.	Perfex	Hyatt	Own	Own	24	450	2827	2-3	1½	2	G.	.....	Yes	32
850	K	1½-Ben.	Ben.	K-W	Own	Own	Sl. G.	Perfex	Own	Own	Own	12	800	2225	3	1⅞-3.64	.....	B. G.	Op.	Yes	33
900	K	1½-Strom.	Ben.	K-W	Own	Own	Sl. G.	Perfex	Hyatt	.....	.....	12	900	2800	2	2.01-2.78	2.78	I. G.	In.	No.	34
750	K	1½-Ben.	Ben.	K-W	Own	Own	Sl. G.	Modine	Hyatt	Own	Hyatt	16	597	2500	2	1.81-2.33	2.33	G.	Op.	No	35
500	K	2½-King.	Ben.	K-W	Own	Own	Sl. G.	Perfex	Hyatt	Own	Hyatt	22	500	2880	1	2	.....	G.	Op.	.....	36
850	K	1⅜-King.	Ben.	Dixie	B. & B.	Cotta	Ind. Cl.	Spirex	Timk.	Timk.	Timk.	14	650	2275	3	¾-4	2½	.....	.....	No	37
800	G-K	1½-Scheb.	.....	K-W	Own	Own	.....	Long	Hyatt	.....	.....	26	320	.....	2	2¼-3¼	2¼	G.	.....	.....	38
800	G-K	1½-Scheb.	.....	K-W	Own	.....	Sel.	Long	.....	.....	.....	26	350	.....	2	2¼-3	2¼	G.	.....	.....	39
550-600	G-K	2 -Scheb.	.....	K-W	Own	.....	.....	Long	.....	.....	.....	32	275	.....	1	.....	2½	G.	.....	.....	40
450-500	G-K	2½-Scheb.	.....	K-W	Own	.....	.....	Long	.....	.....	.....	34	275	.....	1	.....	2½	G.	.....	.....	41
1000	K	-Holl.	Own	Own	Own	Own	Sel.	Own	Gurney / S. R. B.	Timk.	Gurney / S. R. B.	9½	1000	2480	3	1-8	2¾	Worm	In.	.....	42
																					43
1000	G-K	1¼-King.	Ben.	Eise.	B. & B.	Own	St. G.	McCord	N. D.	Timk.	Timk.	10	1000	2618	3	2-3-4	3	B. G.	In.	None	44
900-1000	K	-King.	Ben.	King.	Own	Nutt	S.	Perfex	Hyatt	Own	Own	13	900	3060	2	2.3-3.8	2½	S. G.	.....	Yes	45
900-1000	K	-Ben.	Ben.	Dixie	Own	Nutt.	S.	Perfex	Hyatt	Own	Own	13	900	3060	2	2.3-3.8	2½	S. G.	.....	Yes	46
950	K	1¼-King.	.....	Dixie	Own	Own	Sl. G.	Perfex	Hyatt	Timk.	Hyatt	18	475	2200	2	1½-2½	2½	G.	In.	.....	47
1000	G-K	1¼-King.	Ben.	Eise.	.....	Own	C. M.	Perfex	S. K. F.	.....	.....	10	970	.....	6	1¾-3	2½	S. G.	In.	No	48
950	G-K	-Strom.	Own	Dixie	Own	Own	Own	Own	Hyatt	Own	Own	14	.....	.....	2	.....	2½	S. G.	.....	.....	49
850	G-K	1½-Ben.	Ben.	Bosch	Own	Own	.....	S-J	Hyatt	.....	Hyatt	11⅜	850	2700	2	2½	2¾	Ch.	In.	Yes	50
600	K	-Own	Own	.....	Own	Own	Sel.	.....	.....	None	.....	19	600	.....	2	2¼-3½	2¼	Own	.....	.....	51
750	K	K-Shunt	Own	K-W	Own	Own	Sl. G.	S-J	S. K. F. / Hyatt	Own	Own	14	750	2750	2	2-3	3	I. G.	Op.	Yes	52
																					53
900	G-K	1¼-King.	Ben.	Dixie	Own	.....	Fr.	Perfex	U. S.	.....	Own	14	400-900	2200	7	1-4	2¼	B. G.	Op.	Yes	54
																					55
1250	G	⅞-King.	Ben.	Eise.	Detl.	Covert	Sl. G.	Perfex	.....	.....	.....	6	1250	1963	3	¾-4	2½	I. G.	.....	Yes	56
1000	G-K	¼-King.	Ben.	King.	Own	Own	Sel.	Perfex	G. & H.	Own	Own	13	1000	.....	2	2.43-3.75	2.43	S. G.	Op.	Yes	57
800	K	1⅛-Strom.	Ben.	Dixie	Twin	Foote	Sl. G.	Modine	Hyatt	Hyatt	Hyatt	14	600	2400	2	2½-3.4	2½	S. G.	In.	Yes	58
575	G-K-D	-Own	.....	K-W	Own	.....	Sl. G.	.....	Own	Own	.....	18	575	.....	.....	2¼-2¾	2¼	Ch.	.....	.....	59
1000	K	1½-Own	Ben.	K-W	Own	Covert	Sel.	McCord	Timk.	Hyatt	Hyatt	10	1000	2600	3	1¼-5	2½	S. G.	In.	No	60
1200	G	1 -Carter	Ben.	Dixie	Detl.	Own	Sel.	Eureka	Hyatt	Timk.	Gurney	10	1200	3100	2	2¼-4	3	S. G.	In.	Yes	61
650	K	2 -Scheb.	Ben.	Bosch	Own	Own	Sl. G.	Own	S. K. F.	Own	Own	11½	650	.....	3	2½-3½	3	S. G.	In.	Yes	62
800	K	1½-Strom.	Ben.	Dixie	Own	Own	C. M.	Hooven	Hyatt	Hyatt	Hyatt	14	800	2600	2	2½-4	2½	.....	In.	.....	63
900	K	1½-King.	Ben.	.....	Own	Own	.....	Long	Hyatt	Hyatt	Hyatt	7x11	750	2600	1	2-2¾	2½	.....	.....	Yes	64
800	K	1½-King.	Own	King.	Own	Own	Sel.	Eureka	Own	Own	Own	14	800	2800	2	2¼-3½	2¼	I. G.	Op.	.....	65
900	K	1½-Strom.	Ben.	Eise.	B. & B.	Own	Sel.	Own	Opt.	Hyatt	Hyatt	14	800	2900	.....	.....	3½	I. G.	In.	.....	66
750	K-D	1¾-King.	Ben.	K-W	Own	Own	Sel.	Eureka	Own	Own	Own	14	750	2700	2	1.8-2½	1.8	Cn.	Op.	.....	67
750	G-K-D	1½-Holl.	Ben.	Dixie	Own	Own	Sel.	Eureka	Own	Own	Own	14	750	2700	2	1.8-2½	1.8	Cn.	Op.	.....	68
850	G-K	1½-Strom.	Ben.	Dixie	Bier.	Own	.....	S-J	Hyatt	Own	Own	12	900	2825	2	2½ 5	2½	S. G.	In.	Yes	69
900	G-K	1½-Strom.	Ben.	Berl.	B. & B.	Own	Sl. G.	S-J	N. D.	N. D.	Opt.	14	700	2600	3	1¼-8	2¾	Worm	.....	Yes	70
1000	G-K-D	1¼-King.	Ben.	Eise.	B. & B.	Spec.	Sl. G.	McCord	.....	Timk.	Timk.	8x12	995	2600	2	2¼-4	2¼	I. G.	In.	Yes	71
	G	1½-Holl.	Ben.	Remy	B. & B.	Own	Sl. G.	Modine	Hyatt	.....	Hyatt	9	.....	.....	1	½-3	3½	G.	In.	.....	72
900	G-K-D	1½-King.	Ben.	K-W	M. & E.	Own	Sl. G.	Perfex.	.....	.....	.....	16	600	2600	3	1½-3½	2¼	Ch.	.....	.....	73

Abbreviations: **Traction**—wh., wheel; Cr., crawler. **Engine**—Beav., Beaver; Veer., Veerac; Herc., Hercules; Wauk., Waukesha; Buff., Buffalo; Asso., Associated Manufacturers; Auto., Automatic; Weid., Weidely; Clim., Climax; Twin, Twin City; Cont., Continental; Ruten., Rutenber; Over., Overland; Kenn., Kenneth. **Cylinders**—Ver., vertical; Hor., horizontal; Opp., opposed. **Fuel**—G., gasoline; K., kerosene; D., distillate. **Carburetor**—Ray., Rayfield; King., Kingston; Holl., Holley; Scheb., Schebler; Ben., Bennett; Web., Webster; Zeph., Zephyr; Ens., Ensign; Strom., Stromberg; Till., Tillotson; Zen., Zenith; **Car.**, Carter. **Air-Cleaner**—Donal., Donaldson; Ben., Bennett; Hol., Holley; Par., Parrett; Rain., Rainstrom. **Magneto**—A-K., Atwater-Kent; Sum., Sumter; Eise., Eiseman; Berl., Berling. **Clutch**—B. & B., Borg & Beck; Bier., Bierman; Mun., Mun ie; Rock., Rockwood; Spec., special. **Gearset**—B. & S., Brown & Sharpe; Nutt., Nuttail. **Gearset Type**—Sl. G. sliding gear; Sel. G., selective gear; Fr., friction; Plan., planetary; Sl. J. C., sliding jaw clutch; Sl. Fr. sliding frame. **Final Drive**—S. G., spur gear; Ch., chain; D. R., double reduction; B. G., bull gear. **Drive**—Op., open; In., inclosed.

MOTOR AGE MONTHLY GUIDE TO TRACTORS

Line Number	Tractor and Model	Manufacturer	Drawbar horsepower	Belt horsepower	Number plows recommended	Size separator recommended	Pounds pull drawbar	Weight	Price	Traction	Diameter drive wheels	Make of engine	No. and type of cylinder	Bore and stroke	Normal R. P. M.
74	Oil-Gas, 18-36	Nichols & Shepard Co., Battle Creek, Mich	18	36	4	22x36	.....	13500	.....	Wh.	64	Own	2 Hor.	8 x 10	400
75	Oil-Gas, 25-50		25	50	6	32x52	.....	19000	.....	Wh.	69	Own	2 Hor	9 x 12	375
76	Oil-Gas, 35-70		35	70	8–10	40x60	.....	30000	.....	Wh.	73	Own	2 Hor.	10½ x 14	300
77	Oil-Pull	Advance-Rumely Thresher Co*, Laporte, Ind	12	20	3	22x36	2150	6682	.....	Wh.	51	Own	2 Hor.	6 x 8	560
78	Oil-Pull		16	30	4	28x44	2850	9600	.....	Wh	56	Own	2 Hor.	7 x 8½	530
79	Oil-Pull		20	40	5–6	32x52	3750	12820	.....	Wn.	64	Own	2 Hor.	8 x 10	450
80	Oil-Pull		30	60	8–10	36x60	5900	26700	.....	Wh.	80	Own	2 Hor.	10 x 12	375
81	Oliver, B	Oliver Tractor Co., Knoxville, Tenn	15	30	3-4	32	2800	7700	.....	.....	.....	Beav.	4 Ver.	4½ x 6	900
82	One-Man	Reed Fdy. & Mach. Co., Kalamazoo, Mich	12	25	3	22x24	.....	5000	1,685	Wh.	60	Wauk.	4 Ver.	4½ x 5¾	1000
83	Parrett, H	Parrett Tractor Co , Chicago Heights, Ill	12	25	3	.....	2800	5225	.....	Wh	60	Buda	4 Ver.	4¼ x 5½	1000
84	Parrett, K		15	30	3	.....	.....	5250	1,950	Wh	60	Own	4 Ver	4½ x 6	1000
85	Peoria, J	Peoria Tractor Corp., Peoria, Ill	12	25	3	26	3000	5100	1,985	Wh.	56	Clim.	4 Ver	5 x 6½	800
86	Pioneer, 18-36	Pioneer Tractor Co., Winona, Minn	18	36	4	28	4000	6100	.....	.....	60	Own	4 Hor.	5½ x 6	750
87	Pioneer, 30		30	60	10	36	8000	24000	.....	.....	96	Own	4 Hor	7 x 8	650
88	Plow Man, 15-30	Plow Man Tractor Co., Waterloo, Ia	15	30	3–4	30	3000	5100	1,995	Wh.	60	Buda	4 Ver	4½ x 6	1000
89	Port Huron, 12-25	Port Huron Eng & T. Co., Port Huron, Mich	12	25	3	22x38	2250	6580	1,700	Wn.	56	Chief	4 Ver.	4¾ x 6	900
90															
91	Post, D	Post Tractor Co., Cleveland, Ohio	12	20	2	.....	.....	4300	.....	Wh.	32	Wauk.	4 Ver.	4¼ x 5¾	800
92	Russell, Junior	Russell & Co., Massillon, Ohio	12	24	2	18	2000	6200	.....	Wh	53	Wauk.	4 Ver	4½ x 5¾	1000
93	Russell, Little Boss		15	30	3	24	3000	6900	.....	Wh.	53	Wauk.	4 Ver.	4½ x 6¾	950
94	Russell, Big Boss		20	35	4	30	4000	7600	.....	Wh.	60	Model	4 Ver.	5½ x 7	825
95	Russell, Giant		30	60	8	40	6000	24000	.....	Wh.	84	Own	4 Ver.	8 x 10	525
96															
97	Samson, M	Samson Tractor Co., Janesville, Wis	...	.....	2	20x32	.....	.....	.....	Wh.	.....	.....	4 Ver.	.....	.....
98	Sandusky, J	Dauch Mfg. Co., Sandusky, Ohio	10	20	3	22	2000	4080	1,000	Wh.	48	Own	4 Ver.	4¼ x 5¼	1050
99															
100	Sandusky, E		15	35	4	30	3000	7670	1,750	Wh.	56	Own	4 Ver.	5 x 6½	750
101	Shelby, D	Snelby Trac. & Tr. Co., Shelby, Ohio	15	30	3	.....	.....	4600	.....	Wh.	48	Spec.	4 Ver.	4¾ x 6	900
102	Short Turn, D	Short Turn Tractor Co., Minneapolis, Minn	20	40	3	24	.....	5000	1,500	Wh.	65	.....	4 Ver.	4¾ x 6	950
103															
104															
105	Simplicity	Turner Mfg. Co., Pt. Washington, Wis	14	25	3	24	2600	4300	1,695	Wh.	54	Buda	4 Ver.	4¼ x 5½	1000
106	Square Turn, A	Square Turn Tractor Co., Norfolk, Nebr	18	35	3	28	3200	7400	.....	.....	60	Clim.	4 Ver.	5 x 6½	850
107	Steel Mule	Bates Mach. & Trac. Co., Joliet, Ill	15	22	3	26x36	.....	4600	.....	Cr.	.....	Erd	4 Ver.	4¼ x 6	900
108	Stinson, 4-E	Stinson Trac. Co., Superior, Wis	18	36	4	28x30	.....	7100	2,250	Wh.	60	Beav.	4 Ver.	4¾ x 6	950
109	Tioga, 3	Tioga Mfg. Co., Philadelphia, Pa	15	27	3–4	.....	.....	4950	.....	Wh.	36	Wis	4 Ver.	4½ x 6	1000
110	Titan	International Harvester Co., Chicago	10	20	3	.....	1800	5710	.....	Wh.	54	Own	2 Hor.	6½ x 8	575
111	Topp-Stewart, B	Topp-Stewart Trac Co., Clintonville, Wis	30	45	4–6	.....	7600	7500	4,000	Wh.	42	Wauk	4 Ver.	4¾ x 6¾	950
112	Tracklayer, B	C. L. Best Gas Trac. Co., San Leandro, Calif	12	25	3	.....	2000	5100	2,600	Cr.	.....	Own	4 Ver	4⅜ x 5¼	850
113															
114	Tracklayer, A		35	60	9	.....	6500	17500	5,750	Cr.	.....	Own	4 Ver.	6½ x 8½	650
115															
116	Trundaar, 10	Buckeye Mfg. Co., Anderson, Ind	25	40	4	.....	3750	8800	3,750	Ch. T.	.....	Wauk.	4 Ver.	5 x 6¼	900
117	Twin City, 12-20		12	20	3	20x24	2000	4200	.....	Wh.	50	Own	4 Ver.	4¼ x 6	1000
118															
119	Twin City, 20-35	Minneapolis Steel & Machinery Co., Minneapolis, Minn	20	35	5	28	3400	7800	.....	Wh.	60	Own	4 Ver.	5½ x 6	950
120	Twin City, 40-65		40	65	8	40	7500	23700	.....	Wh.	84	Own	4 Ver.	7¾ x 9	535
121	Twin City, 60-90		60	90	12	40	11250	28000	.....	Wh.	84	Own	6 Ver.	7¼ x 9	535
122	Uncle Sam, B-19	U. S. Trac. & Machy. Co., Menasha, Wis	20	30	3	28	3000	4250	.....	Wn.	50	Beav	4 Ver.	4¾ x 6	900
123	Victory, 15-30	Victory Tractor Co., Greensburg, Ind	15	30	3	28	2500	3450	1,750	Wh.	48	Wauk.	4 Ver.	4¼ x 5¾	900
124	Vim	Vim Tractor Co., Schleisingerville, Wis	10	20	2 3	24	1800	3500	1,650	Wh.	48	Wauk.	4 Ver.	3¾ x 5¼	1050
125															
126	Wallis, K	J. I. Case Plow Works Co., Racine, Wis	10	25	3	24x40	2600	3560	.....	Wh.	48	Own	4 Ver.	4¼ x 5¾	900
127	Waterloo Boy, N	Waterloo Gasoline Eng. Co., Waterloo, Ia	12	25	3	.....	2000	5900	.....	Wh.	52	Own	2 Hor.	6½ x 7	750
128	Wetmore	Wetmore, H. A., Sioux City, Ia	12	25	3	22	.....	2900	1,650	Wh.	46	Wauk.	4 Ver.	4 x 5¾	960
129	Wisconsin, E	Wisconsin Farm Trac. Co., Sauk City, Wis	16	30	3–4	28	3500	5440	.....	Wh.	52	Clim.	4 Ver.	5 x 6½	800
130	Yuba, Bal Tread	Yuba Mfg. Co., Marysville, Calif	12	20	3	.....	3500	7000	2,945	Cr	.....	Wauk.	4 Ver.	4½ x 6¾	700
131	Yuba, Ball Tread		20	35	6-7	.....	6000	10100	4,892	Cr.	.....	Wis.	4 Ver.	5¾ x 7	700

One and Two-Horse Tractors

132	Avery, 5-10 B	Avery Co., Peoria Ill	5	10	2	22x32	900	2600	.....	Wh.	38	Own	4 Ver.	3 x 4	1250
133	General Purpose	Allis-Chalmers Mfg. Co., Milwaukee, Wis	6	12	1–16	.....	1000	2500	795	Wh.	48	Le Roi	4 Ver.	3⅛ x 4½	1000
134	Heider, D	Rock Island Plow Co., Rock Island, Ill	9	16	2	20	1500	4000	.....	Wh.	54	Wauk.	4 Ver.	4¼ x 5¾	1000
135															
136	Indiana	Indiana Silo Co., Anderson, Ind	5	10	1	.....	900	2000	.....	Wh.	50	Le Roi	4 Ver.	3⅛ x 4½	950
137	International	International Harvester Co., Chicago	8	16	2	.....	1350	3600	.....	Wh.	40	Own	4 Ver.	4¼ x 5	1000
138	La Crosse, M	La Crosse Trac. Co., La Crosse, Wis	7	12	1–16	18	1000	2600	750	Wh.	48	Own	2 Hor.	4 x 6	1000
139	Shawnee	Shaw Enochs Trac. Co., Minneapolis, Minn	9	18	2	22	2100	3800	.....	Wh.	48	Gray	4 Ver.	3½ x 5	1400
140	Shelby, C	Shelby Trac. & Tr. Co., Shelby, Ohio	9	18	2	20	.....	3500	.....	Wh.	42	Wauk.	4 Ver.	3¾ x 5¼	1000
141	Traylor, 6-12	Traylor Engrg. & Mfg. Co., Cornwells, Pa	6	12	1	.....	.....	1700	815	Wh.	38	Le Roi	4 Ver.	3⅛ x 4½	1000
142	Victory, 9-18	Victory Tractor Co., Greensburg, Ind	9	18	2	20	1500	3300	1,385	Wh.	48	Gray	4 Ver.	3½ x 5	1000

Abbreviations: **Traction**—wh., wheel; Cr., crawler. **Engine**—Beav., Beaver; Veer., Veerac; Herc., Hercules; Wauk., Waukesha; Buff., Buffalo; Asso., Associated Manufacturers; Auto., Automatic; Weid., Weidely; Clim., Climax; Twin, Twin City; Cont., Continental; Ruten., Rutenber; Over., Overland; Kenn., Kenneth. **Cylinders**—Ver., vertical; Hor., horizontal; Opp., opposed. **Fuel**—G., gasoline; K., kerosene; D., distillate. **Carburetor**—Ray., Rayfield; King., Kingston; Holl., Holley; Scheb., Schebler; Ben., Bennett; Web., Webster; Zeph., Zephyr; Ens., Ensign; Strom., Stromberg; Till., Tillotson; Zen., Zenith; Car., Carter. **Air-Cleaner**—Donal., Donaldson; Ben., Bennett; Hol., Holley; Par., Parrett; Rain., Rainstrom. **Magneto**—A-K., Atwater-Kent; Sum., Sumter; Eise., Eiseman; Berl., Berling. **Clutch**—B. & B., Borg & Beck; Bier., Bierman; Mun., Muncie; Rock., Rockwood; Spec., special. **Gearset**—B. & S., Brown & Sharpe; Nutt., Nuttail. **Gearset Type**—Sl. G. sliding gear; Sel. G., selective gear; Fr., friction; Plan., planetary; Sl. J. C., sliding jaw clutch; Sl. Fr. sliding frame. **Final Drive**—S G., spur gear; Ch., chain; D. R., double reduction; B. G., bull gear. **Drive**—Op., open; In., inclosed.

AND THEIR TECHNICAL SPECIFICATIONS

Normal R. P. M.	Fuel	Make and size of carburetor	Make of air cleaner	Make of magneto	Make of clutch	Make of gearset	Type of gearset	Make of radiator	Make of bearings in transmission	Make of bearings in front axle	Make of bearings in rear axle	Belt pulley diameter	Belt pulley R. P. M.	Belt speed F. P. M.	Speeds forward	Speed range M. P. H.	Recommended plowing speed	Final drive	Drive	Furrow wheel	Line Number
400	K	-King.	.....	Dixie	Own	Own	Sl. G.	Perfex	Own	Own	Own	8x22	.....	.....	2	1½-3	1½-3	S. G.	.....	.....	74
375	K	2½-King.	.....	Wied.	Own	Own	Sl. G.	Perfex	Own	Own	Own	9x24	.....	.....	1	2.1	2.1	S. G.	.....	.....	75
300	K	3 -King.	.....	Wied.	Own	Own	Sl. G.	Perfex	Own	Own	Own	12x30	.....	.....	1	1.86	1.86	S. G.	.....	.....	76
560	K-D	2¼-Own	Donald.	Bosch	Own	Own	Sl. G.	Own	Own	Own	Hyatt	19	560	2790	2	2.1-3.26	2.1	S. G.	Op.	No	77
530	K-D	2½-Own	Donald.	Bosch	Own	Own	Sl. G.	Own	Own	Own	Hyatt	23	530	3190	2	2.1-3	2.1	S. G.	Op.	No	78
450	K-D	2¾-Own	Donald.	Bosch	Own	Own	Sl. G.	Own	Own	Own	Hyatt	26	450	3060	2	2-3.2	2	S. G.	Op.	No	79
375	K-D	3¼-Own	None	Bosch	Own	Own	Sl. G.	Own	Own	Own	Own	36	375	3540	1	1.9	1.9	S. G.	Op.	No	80
900	G-K	1½-Ben.	Ben.	Dixie	.....	Own	Sl. G.	Modine	Hyatt	.....	Hyatt	21½	2600	450	2	1¾-2½	2½	S. G.	.....	.....	81
1000	G-K	1¼-Ben.	Ben.	Dixie	Bier.	Own	Sl. G.	Modine	Hyatt	.....	Hyatt	14½	2600	703	2½-3½	.....	2½	B. G.	In.	Yes	82
1000	K	1¼-King.	Own	Eise.	Own	Own	Sl. G.	Perfex	.....	Hyatt	Hyatt	12	1000	3141	3	1.80-4	.....	I. G.	In.	.....	83
1000	G-K	1⅜-King	Own	Eise.	Own	Own	Sl. G.	Perfex	.....	Own	Own	12	1000	3100	2	2.6-4.07	2¾	S. G.	.....	Yes	84
800	K	1½-Strom.	Ben.	Eise.	Own	Nutt.	Sl. G.	Eureka	Hyatt	.....	.....	14	650	2500	2	2½-4	2½	I. G.	.....	Yes	85
750	G-K	1½-King.	Ben.	K-W	Own	Own	.....	S-J	Timk.	Timk.	Timk.	14	750	.....	3	1¾-4	2½	S. G.	.....	.....	86
650	G-K	2 -King.	Ben.	K-W	Own	Own	Sl. G.	S-J	Own	Own	Own	17½	650	.....	3	1¾-4¼	2½	.....	.....	.....	87
1000	G-K	1¼-Strom.	.....	Dixie	Twin	Foote	Sl. G.	Perfex	Hyatt	Hyatt	Hyatt	14	590	2200	2	2-3	.....	I. G.	Op.	.....	88
900	G-K	1⅜-King.	Own	Eise.	Own	Own	.....	Bremer	S. K. F.	Plain	Plain	14	650-1065	2380-3900	7	1⅞-4	2	S. G.	In.	Yes	89
																					90
800	G-K	1¼-King.	Ben.	Split.	Own	Own	.....	Perfex	Opt.	Timk.	Timk.	14	2500	2500	2	1-3	3	G.	.....	Yes	91
1000	K	1¼-King.	Ben.	Bosch	Own	Cotta	Sl. G.	.....	.....	.....	.....	12½	915	3000	3	1½-3¾	2¼	S. G.	Op	.....	92
950	K	1¼-King.	Ben.	Dixie	Own	Cotta	Sl. G.	.....	.....	.....	.....	12½	810	2850	3	1½-3¾	2¼	S. G.	Op.	.....	93
825	K	1½-King.	Ben.	Dixie	Own	Own	Sl. G.	.....	.....	.....	.....	12½	840	2749	2	2.4-3¾	2.4	S. G.	Op.	.....	94
525	K	2 -King.	Ben	Bosch	Own	Own	Sl. G.	.....	.....	.....	.....	24	525	3310	2	2-4½	2	S. G.	Op.	.....	95
																					96
	G	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18	412	.....	2	.....	.....	.....	.....	.....	97
1050	G-K-D	1¼-King.	Ben	Dixie	Own	Own	Sel.	Perfex	Hyatt N. D.	Own	Own	10	1000	2600	2	2-3	2	I. G.	Op.	Yes	98
																					99
750	G-K-D	2 -King.	Ben.	Dixie	Own	Own	Sel.	C. & P.	Own	Own	Own	15	800	2950	3	2-5½	2	I. G.	Op.	No	100
900	G-K	-King	Ben.	Dixie	Own	Foote	Sl. G.	Modine	Hyatt	Timk.	Hyatt	14	650	.....	2	2½-3½	3	I. G.	In.	Yes	101
950	G-K	1½-Opt.	Opt.	Dixie	.....	Own	Sel.	Splitex	Own	Own	Own	18	950 700 490	.....	2	2-3	2½-3	I. G.	.....	Yes	102
																					103
																					104
1000	G-K	1¼-King.	Ben	Dixie	Own	Own	.....	Perfex	Hyatt	Own	Own	14	600	600	2-2½	1¾-3	2½	.....	.....	Yes	105
850	G-K	1½-Strom.	Ben.	Dixie	.....	.....	Own	Modine	Hyatt	Hyatt	Hyatt	12	850	2669	1	2½	2½	I G.	.....	Yes	106
900	G-K-D	1¼-Ben.	Ben.	Dixie	B. & B	Own	Sl. G.	Modine	Timk.	Timk.	Timk.	12	750	2300	2	2.33-3.5	2.33	S. G.	.....	.....	107
950	K	1⅜-King	Rain	Dixie	Own	Own	Sl. G.	Todd	Hyatt	Hyatt	Own	12	950	2985	1	2½-3	3	S. G.	In.	Yes	108
1000	G	1¼-Strom.	Ben.	Split.	Twin	Own	Sel.	G. & O.	Gurney	Timk.	Opt.	12	.....	.....	2	2.7-3.7	2.7	G.	In.	No	109
575	G-K-D	-Own	.....	K-W	Own	.....	Sl. G.	.....	Own	Own	.....	18	575	.....	.....	.....	2¼-2¾	2¾	Ch.	.....	.....	110
950	G	1½-Strom.	Ben.	Eise.	Hilliard	Own	Sel.	Bremer	Hyatt	N. D.	N. D	10	950	2600	3	1¾-4½	2¾	I G.	In.	.....	111
850	D	1½-Ens.	Ben.	Split.	Own	Own	Sl. G	Own	Hyatt Timk.	.....	Hyatt	9	9000	1971	2	2¼-3	3	I. G.	.....	.....	112
																					113
650	D	2 -Ens.	Ben.	Bosch	Own	Own	Sl. G.	Own	Hyatt Timk.	.....	Timk.	16	650	2720	2	3-2	3	I. G.	.....	.....	114
																					115
900	G-K-D	-Strom.	Own	Bosch	Hill.	Own	Sl. G.	Modine	Opt.	.....	H. & T.	.....	900	2600	2	1.3-2.5	.....	S. G.	In.	.....	116
1000	G-D	1¼-Holl.	Ben.	Bosch	B. & B.	Own	Sl. G	Modine	Hyatt	Own	Hyatt	16	650	2700	2	2.2-2.9	2.9	S. G.	In.	Yes	117
																					118
950	G-K	2 -Hol.	.....	Bosch	Twin	Own	Sl. G.	Modine	Hyatt	Own	Hyatt	21	466	2560	2	2.2-29	2.9	S. G.	In.	.....	119
535	G-K	2½-Hol	.....	K-W	Own	Own	Sl. G.	Own	Own	Own	Own	23	535	200	1	2	2	G.	Op.	.....	120
535	G-K	3 -King.	.....	K-W	Own	Own	Sl. G.	Own	Own	Own	Own	23	535	3200	1	2	2	S.	Op.	.....	121
900	K	1½-Ben.	Ben.	Dixie	Twin	Nutt.	Sl. G.	Perfex	Timk.	Timk.	Timk.	11	900	2600	2.6-3.8	2-4	2.6	S. G.	In.	Yes	122
900	G	1¼-Ben.	Ben	Berl.	B. & B.	Own	Sl. G.	James.	Schatz	Hyatt	Opt.	10	800	2600	2	1¾-4	2½	S. G.	.....	.....	123
1050	G-K	-Ben	Par	Simms.	B. & B.	Own	S. G.	B. & W.	Gurney	Gurney Hyatt	Hyatt	10	1050	2300	2	2½-3½	2½	I. G.	In.	Yes	124
																					125
900	G-K-D	1¼-Ben.	Ben.	Berl.	Twin	Own	Sl. G.	Modine	Timk.	Hyatt	Timk.	18	430	2300	2	2½-3½	2½-3½	S. G.	In.	.....	126
750	K	1½-Scheb.	Own	Dixie	Own	Own	Sl. G.	Modine	Hyatt	.....	Hyatt	14	750	2750	2¼-3	2¼-3	2¼-3	I. G.	Opt.	Yes	127
900	G	1¼-Scheb	.....	Split.	Full.	Fuller	S. G.	Ideal	.....	.....	Timk.	12	900	.....	3	2-5	3⅜	I. G.	In.	Yes	128
800	K	1½-Strom.	Ben.	Eise.	B. & B.	Foote	S. G.	Perfex	Hyatt	.....	.....	16	600	2600	2	1¾-3¾	2½	S. G.	In.	.....	129
700	D	1¼-Ens.	Donald.	Bosch	B. & B.	Own	S. G.	Own	Hyatt	.....	Hyatt	12	700	2200	3	1.5-4	2.08	B. P.	.....	.....	130
700	D	-Strom.	Donald.	Bosch	Para.	Own	S. G.	Own	Hyatt	.....	Hyatt	10-14	700	1835	2	2.06-3.28	2.06	I. G.	.....	.....	131

One and Two-Horse Tractors

1250	G-K	¾-King.	Ben.	K-W	Own	Own	Sl. G.	Own	Hyatt	Own	Own	10	800	2450	3	1⅝-4½	2⅛	S. G.	Op.	.....	132
1000	G	⅞-King.	Ben.	.....	B. & B	Own	Sl. G	Own	Gurney	Own	Own	10	1000	2600	1	1½-2.4	2.4	.....	.....	Yes	133
	G-K	1 -King.	Ben	Dixie	Own	.....	Fr.	Perfex	U. S	.....	Own	12	400-1000	2200	7	1-5	1¼	B. G.	Op.	Yes	134
																					135
950	K	⅞-King.	Ben.	A-K	Own	Own	Sl. G	Cand.	.....	.....	.....	.....	1200	.....	1¼-4	.....	.....	Ch.	Op.	.....	136
1000	G-K-D	-Ens.	.....	Dixie	Own	.....	Sl. G	B. & L.	Own	Own	.....	12¼	625	.....	.....	1¾-4.1	2⅝	Ch:	.....	.....	137
1000	K	1¼-King.	Ben.	.....	Own	Own	Own	Hopper	.....	Own	Own	10	1000	2600	1	1¾-2½	2½	....	.....	Yes	138
1400	G	1 -Scheb.	Ben.	Berl.	B & B.	Own	.....	Todd	Fafnir	.....	Hyatt	8	.....	2600	2	1¾-2.4	2.4	:.	In	Yes	139
1000	G	1 -King.	Ben.	Dixie	Full.	Full.	Set	Modine	.....	Timk.	Timk.	10	850	.....	3	1¾-4¾	2.6	I. G.	In.	Yes	140
1000	G	-King.	Own	Dixie	B. & B	Own	Sl. G.	G. & O.	Own	Own	.....	.....	1200	1000	1	3½-5	3½	B. G.	.....	.....	141
1000	G	1 -Car.	Ben.	Berl.	B & B.	Own	Sl. G	James.	Schatz	Hyatt	Opt.	.....	820	2650	2	1¾-4¼	2½	S. G.	.....	.....	142

Abbreviations: **Traction**—Wh., wheel; Cr., crawler. **Engine**—Beav., Beaver; Veer., Veerac; Herc., Hercules; Wauk., Waukesha; Buff., Buffalo; Asso., Associated Manufacturers; Auto., Automatic; Weid., Weidely; Clim., Climax; Twin, Twin City; Cont., Continental; Ruten., Rutenber; Over., Overland; Kenn., Kenneth. **Cylinders**—Ver., vertical; Hor., horizontal; Opp., opposed. **Fuel**—G, gasoline; K, kerosene; D, distillate. **Carburetor**—Ray., Rayfield; King., Kingston; Holl., Holley; Scheb., Schebler; Ben., Bennett; Web., Webster; Zeph., Zephyr; Ens., Ensign; Strom., Stromberg; Till., Tillotson; Zen., Zenith; Car., Carter. **Air-Cleaner**—Donal., Donaldson; Ben., Bennett; Hol., Holley. **Magneto**—A-K., Atwater-Kent; Sum., Sumter; Eise., Eiseman; Berl., Berling. **Clutch**—B. & B., Borg & Beck.; Bier., Bierman; Mun., Muncie; Rock., Rockwood; spec., special. **Gearset**—B. & S., Brown & Sharpe; Nut., Nuttall. **Gearset type**—Sl. G., sliding gear; Sel. G., selective gear; Fr., friction; Plan., planetary; Sl. J. C., sliding jaw clutch. **Final Drive**—S. G., spur ger Ch. chain; D. R., double reduction; B. G., bullgear. **Drive**—Op., open; In., inclosed.

MOTOR AGE MONTHLY GUIDE TO TRACTORS

Orchard Tractors

Line Number	Tractor and Model	Manufacturer	Drawbar horsepower	Belt horsepower	Number plows recommended	Size separator recommended	Pounds pull drawbar	Weight	Price	Traction	Diameter drive wheels	Make of engine	No. and type of cylinder	Bore and stroke	Normal
143	Allwork II	Electric Wheel Co., Quincy, Ill.	12	25	3	24	2600	4500	.....	Wh.	42	Own	4 Ver.	4¾ x 6	
144	Avery, 6-cyl.	Avery Co., Peoria, Ill.	.....	.....	.....	22x32	.....	3164	.....	Wh.	38	Own	6 Ver.	3 x 4	1200
145	Cletrac, W.	Cleveland Trac. Co., Cleveland, Ohio	12	20	2	24x40	1500	3400	1,395	Cr.	.....	Own	4 Ver.	4 x 5½	1200
146	Fageol, D.	Fageol Motors Co., Oakland, Calif.	9	12	2	.....	1450	3500	1,525	.....	48	Lyc.	4 Ver.	3½ x 5	1200
147	Fordson	Ford Motor Co., Highland Park, Mich.	.....	20	2	20x34	1800	2700	850	Wh.	42	Own	4 Ver	4 x 5	1000
148															
149	International, 8-16	International Harvester Co., Chicago	8	16	2	.....	1350	3600	.....	Wh.	40	Own	4 Ver.	4 x 5	1000
150	Moline Orchard	Moline Plow Co., Moline, Ill.	9	18	2	24	2000	3380	.....	Wh	44	Own	4 Ver.	3½ x 5	.....
151	Ranger	So. Motor Mfg. Ass., Houston, Tex.	8	16	1	.....	1100	3300	25	Wh	30	Le Roi	4 Ver.	3⅛ x 4½	1100
152	Stockton, A	Stockton Trac. Co., Stockton, Calif.	8	16	2-3	20x34	1850	3150	1,225	Wh.	44	H-S	4 Ver.	3½ x 5	.....

Garden Tractors

153	Beeman, G.	Beeman Tractor Co., Minneapolis, Minn.	2	4	1-7	.....	260	550	310	Wh.	25	Own	1 Ver.	3½ x 4½	800
154	Do-It-All	Consolidated G. & Gas Eng. Co., New York	3	6	1	.....	.....	1000	495	.....	24	Own	1 Ver.	4½ x 5	900
155	Market	Market Garden Trac. Co., Minneapolis, Minn	2	4½	1-7	.....	.....	550	.....	.....	24	Veer.	1 Hor.	4 x 4	600
156	Merry Garden	Atlantic Mach. Mfg. Co., Cleveland, Ohio	.....	2	.....	.....	.....	250	195	.....	20	.....	1 Ver.	2⅝ x 2½	900
157	New Britain, 1	New Britain Mch. Co., New Britain, Conn	3	6	1-9	.....	400	700	450	Wh	26½	Own	2 Ver.	2¾ x 4	1500
158	New Britain, 2		3	6	1-9	.....	400	750	500	Wh.	32	Own	2 Ver.	2¾ x 4	1200
159	Oldsmar	Oldsmar Tractor Co., Oldsmar, Fla.	1-3	5	1	.....	150-450	1200	375	Wh.	32	Evin.	1 Ver.	5 x 5½	800
160	Princess Pat	Scientific Farming Mchy., Minneapolis, Minn.	.....	.....	2	24x26	2000	3500	1,750	Wh.	46	Buda	4 Ver.	4¼ x 5½	1000
161	Tillermobile, A	Tillermobile Co., Minneapolis, Minn.	2	6	1-8	.....	.....	625	385	Wh.	30	Veer.	1 Ver.	4 x 4	1200
162	Universal, 20	Elderfield Mechanics Co., Pt. Washington, N. Y.	1	4	1	.....	250	750	485	.....	30	Own	1 Ver.	3½ x 5	1000
163	Utililitor	Midwest Engine Co., Indianapolis, Ind.	1½	3½	1	.....	150-200	750	380	Wh.	24¾	Own	1 Ver.	3½ x 4½	1200

Motor Cultivators

164	Avery, Single Row	Avery Co., Peoria, Ill.	5	10	.....	.....	900	2650	.....	Wh.	42	Own	4 Ver.	3 x 4	1200
165	Avery, C		.....	.....	2	22x32	.....	3164	.....	Wh.	42	Own	6 Ver.	3 x 4	1200
166	Bailor, A	Bailor Plow Mfg. Co., Atchison, Kan.	6	.....	.....	.....	.....	2150	925	Wh.	44	Le Roi	4 Ver.	3⅛ x 4½	1000
167	Bailor, W		6	.....	.....	.....	.....	1800	775	Wh.	40	Le Roi	4 Ver.	3⅛ x 4½	1000
168	Detroit Culto, AA	Detroit Culto-Tractor Corp., Detroit	9	16	2	20x28	1600	1800	775	Wh.	42	Own	2 Ver.	4 x 6	400
169	E-B	Emmerson-Brantingham Co., Rockford, Ill.	.....	.....	None	.....	.....	3200	.....	Wh.	42	Le Roi	4 Ver.	3½ x 4½	1000
170	Heider, 10	Rock Island Plow Co., Rock Island, Ill	6	10	1	.....	.....	2700	.....	Wh.	46	Le Roi	4 Ver.	3⅛ x 4½	.....
171	Parrett, J	Parrett Motor Corp., Chicago	6	.....	2	None	.....	3000	890	Wh.	44	Le Roi	4 Ver.	3⅛ x 4½	1000
172	Shawnee	Shaw Enochs Trac. Co., Minneapolis, Minn.	6	12	1	.....	1100	2600	.....	Wh.	48	Le Roi	4 Ver.	3⅛ x 4½	1000
173	Toro	Toro Motor Co., Minneapolis, Minn.	6	.....	.....	.....	1100	2800	950	Wh.	42	Le Roi	4 Ver.	3⅛ x 4½	1200

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Service Station Facilities Show Increase in Kalamazoo

Kalamazoo, Mich., Nov. 19—The remarkable growth of automobile sales and service in Kalamazoo has been demonstrated during the past eighteen months by a corresponding development in garage and service station facilities. In that period no fewer than ten new garages have been erected, while four other structures have been enlarged and remodelled.

The largest sales and service station is now being built for R. E. Fair, Ford distributor. When completed it will cost over $100,000. Howard J. Cooper, Dodge dealer, has just moved into a $75,000 station on automobile row. Within two blocks of the Cooper garage along west Main street are new garages erected for the Packard Motor Car Co.'s factory branch, the Oldsmobile Sales Co. and the Thomas M. Orrell Co., dealers in Franklin and Oakland cars, and the Kalamazoo truck. Moulton & Dalgleish, Studebaker dealers, also have secured space on the row.

Michael Hennes has leased the new Michigan Central garage and handles the Jackson car. William Johnson has erected a new building for his Elcar agency. Fred Gilsey & Son have opened a large service station on the east side. The Stevens-Buick Sales Co. has an up-to-date three story establishment. W. W. Lung occupies a new station but a block off automobile row. He handles trucks exclusively. F. N. Milliman, distributor for the Scripps-Booth and Imperial, has enlarged his salesrooms.

NASH ADDRESSES DEALERS

Boston, Nov. 19—"Business is bound to be better" was the message delivered by Charles W. Nash, president of the Nash Motors Company, to the Nash dealers of New England at a luncheon given by C. P. Rockwell at the Copley-Plaza yesterday. There were about 100 guests at the luncheon, including Daniel J. Wing, president of the First National Bank; J. C. Howe, vice president of the Old Colony Trust Company, and James T. Wilson, vice president of the Nash Motors Company. Mr. Nash said in part:

"Just at present we are hearing a lot of condemnation of bankers, but I want to tell you, gentlemen, that it was the bankers who were the saviors of the industrial situation in America and personally I am glad that they did tighten up on loans last spring, otherwise we would have had an overproduction of automobiles in June, July and August that would have led to a very serious condition of affairs."

SHOW FOR HAMILTON, OHIO

Hamilton, Ohio, Nov. 19—The Hamilton Auto Dealers' Association have arranged for a show next spring to be given under the auspices of the association. A committee to work out the details was appointed and John Schmitt of the West Side Motor Co. and Adrian Wuille of the Miami Motor Co. will take care of the arrangements.

AND THEIR TECHNICAL SPECIFICATIONS

Orchard Tractors

				Make of magneto	Make of clutch	Make of gearset	Type of gearset	Make of radiator	Make of bearings in transmission	Make of bearings in front axle	Make of bearings in rear axle	Belt pulley diameter	Belt pulley R. P. M.	Belt speed F. P. M.	Speeds forward	Speed range M. P. H.	Recommended			
143	G-K	1½-King.	Ben.	King.	Own	Own	Sl. G.	Perfex	Opt.	Timk.	Hyatt	11	900	2575	3	1¾-3⅞	2½	B. G.	In.	.....
144	G-K	¾-King.	Ben.	K-W	Own	Own	Sl. G.	Own	Hyatt	Own	Hyatt	10	780	2450	3	1½-4¼	2⅛	S. G.	Op.	.....
145	G-K-D	1⅛-King.	Own	Teagle	Own	Own	Sl. G.	McCord	.....	Timk.	Timk.	8	1265	2500	1	1-3½	3	I. G.	In.	.....
146	G-K-D	1 -Zen.	Own	Dixie	Own	Own	C. M.	Modine	Timk.	Timk.	Timk.	8	1250	2600	1	¾-3	2½	S. G.	.....	.....
147	K	-Holl.	Own	Own	Own	Own	Sel.	Own	Gurney S. R. B.	Timk.	Gurney S. R. B.	9½	1000	2480	3	1-8	2¾	Worm	In.	.....
148																				
149	K	-Ens.	Own	Dixie	Own	Own	Sl. G.	B. & L.	Own	Own	.....	12¼	635	2060	3	1¾-4.1	2⅝	Ch.	.....	.....
150	G	1½-Holl.	Ben.	Remy	B. & B.	Own	Sl. G.	Modine	Hyatt	.....	Hyatt	9	.....	.....	1	½-3	3½	G.	In.	.....
151	G	1-Holl.	Ben.	Dixie	B.&B.	Own	G. M.	Bremer	Hyatt	Hyatt	Hyatt	12	800	2500	1	1½-2½	1½-2	B. G.	In.	No
152	G-D	1 -King.	Ben.	Berl.	Own	Own	Sl. G.	Modine	Hyatt	Own	Hyatt	12	400	.....	2	2½-3½	2½	G.	In.	No

Garden Tractors

153	G	¾-King.	Donald.	Heinze	Own	Own	.....	S-J	.....	None	None	4½	850	900	1	¾-3	2	G.	.....	Yes
154	G	1 -Holl.	Donald.	Berl.	Own	Own	.....	Own	Own	Own	.....	6	.....	.....	1	1-3	2½	.....	.....	.....
155	G	1 -Scheb.	Ben	Berl.	Own	Own	Spec.	.....	Hess-B	Timk.	.....	6	2000	.....	1	1½-2½	2½	Worm	.....	.....
156	G	.....	.....	Evin.	Own	Own	Sl. G.	.....	Own	.....	Own	6	200	.....	1	1¼-2¼	.....	S. G.	.....	.....
157	G	¾-King.	Ben.	Dixie	Own	Own	.....	G. & O.	Own	.....	.....	5½	1500	2160	1	1-3	.....	B. G.	In.	.....
158	G	¾-King.	Ben.	Dixie	Own	Own	.....	G. & O.	Own	.....	.....	5½	1500	2160	1	1-3	.....	B. G.	In.	.....
159	G	1 -Scheb.	Own	Opt.	Own	.....	.....	None	Own	.....	.....	5	580	240	2½	.....	2½	.....	.....	.....
160	K	1¼-Ben.	Martain	Dixie	B. & B.	Own	Sl. G.	S-J	Hyatt	Hyatt	Hyatt	12	1000	3100	2	2½-4½	2½	I. G.	In.	Yes
161	G-K	-Veer.	Own	Berl.	Own	Own	D. R	.....	.....	.....	.....	11	.....	.....	1	1-3	2½	B. G.	.....	.....
162	G	⅞-Zen.	.....	Bosch	Own	Own	.....	Main	.....	.....	.....	6	1000	.....	1	1-3	2	Worm	.....	.....
163	G	¾-King.	Own	Eise.	Own	Own	.....	Modine	.....	.....	.....	4½	1200	1200	1	1-4	2¼	I. G.	In.	.....

Motor Cultivators

164	G-K	¾-King.	Ben.	K-W	Own	Own	Sl. G.	Own	Hyatt	Own	Hyatt	10	800	2450	3	2 -5½	2½	S. G.	Op.	.....
165	G-K	⅞-King.	Ben.	K-W	Own	Own	Sl. G.	Own	Hyatt	Own	Own	10	800	2500	3	1⅝-4⅔	2¼	S. G.	Op.	.....
166	G	⅞-King.	Ben.	Dixie	B. & B.	.....	.....	Perfex	.....	Hyatt	Hyatt	12	.....	.....	2	2½-3.7	.....	Ch.	.....	.....
167	G	⅞-King.	Ben.	Dixie	B. & B.	.....	.....	Perfex	.....	Hyatt	Hyatt	.....	.....	.....	2	2½-3.7	.....	Ch.	.....	.....
168	G	1¼-Strom.	Own	Bosch	Own	Own	Sl. G.	Own	Hyatt	Own	Own	8	885	1800	2	1-3	2⅛	B. G.	In.	.....
169	G	-Holl.	Ben.	Dixie	Own	None	None	Perfex	Hyatt	Own	Hyatt	7⅛	995	.....	1-5	1½-3½	None	.....	.....	.....
170	G	⅞-King.	Ben.	Dixie	.....	.....	.....	Perfex	Opt.	.....	.....	.....	.....	.....	.....	1½-3½	.....	B. G.	Op.	.....
171	G	¾-King.	Own	Eise.	B. & B.	Own	Sel.	Modine	S. K. F.	Hyatt	Hyatt	6	1000	.....	2	1.3-3.5	.....	I. G.	.....	No
172	G	1 -Scheb.	Ben.	Berl.	B. & B.	Own	.....	Todd	Fafnir	.....	Hyatt	8	.....	2600	2	1¾-2.9	2.9	Worm	In.	Yes
173	G	⅞-King.	Ben.	Eise.	Own	Own	Sl. G.	B. & W	Opt.	.....	Hyatt	8	1200	2400	2	1-3½	2.7	B. G.	In.	.....

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Date Set for Opening of Show of Dealers in San Francisco

San Francisco, Nov. 20—Plans for the San Francisco Automobile Show are progressing rapidly now that the opening date has been set by the committee in charge of the annual local automobile event. The San Francisco show will open on Feb. 19, next, and from the preliminary plans made public by Manager George Wahlgreen, it will outshine all previous ones in point of artistic decoration and in amount of space taken for the display of automobiles, trucks, tractors and accessories.

In addition to the Auditorium proper, an enormous tent, 400 ft. long by 100 ft. wide, will be erected where the trucks and trailers will be on display. The passenger cars as in years past will be shown on the main floor of the Civic Auditorium. The second, third and fourth floors will be devoted to the largest display of accessories ever shown west of Chicago. The basement, heretofore used by trucks, will be turned over to the tractor men and a big tractor showing is assured. In every way, the San Francisco show is expected to set new standards of excellence, and the local dealers' association, through Wahlgreen, is working for national recognition to put the salon here in the same grouping as the New York and Chicago shows.

PONTIAC DEALERS ORGANIZE

Pontiac, Mich., Nov. 21—Pontiac automobile dealers after an investigation of the successful operation of the Detroit Auto Dealers' Association, in the stabilization of the used car industry and the improvement in general selling conditions, have organized an association along similar lines under the name of the Pontiac Auto Dealers' Association. Edward B. Hodges was named president of the organization meeting at a dinner at the Board of Commerce with Dr. Allen McLaughlin treasurer and Frank Milward secretary. A schedule of uniform prices for used cars was taken up at the initial meeting but definite action was postponed pending investigation and further conferences.

SUE DIXIE RUBBER HEAD

Memphis, Tenn., Nov. 20—The suit brought by the stockholders of the Dixie Rubber Co. against L. C. Cadenhead, president of the corporation, and four directors, will be heard on its merits in Chancery court at a date not yet set. A demurrer filed by the defendants was dismissed by the chancellor with the understanding that they be given a reasonable time to file their answer to the original bill.

In their bill the stockholders ask that Cadenhead be deposed and a receiver appointed on the ground of gross mismanagement. Counsel for Cadenhead argued in his demurrer that the case should be dismissed on the ground that they had failed to seek redress from the directors and that they should have gone into court only as a last resort.

From the Four Winds

Glimpses at the World of Motordom

COMING MOTOR EVENTS

Automobile Shows

Houston, Texas	Automobile Show	Nov. 20-28
Los Angeles, Cal.	Automobile Show	Dec. 11-20
Akron, Ohio	Automobile Show	Dec. 25-Jan. 2, 1921
New York	Highway Transportation Show	Jan. 3-8, 1921
Los Angeles, Cal.	Automobile Show	Jan. 7, 1921
New York	National Passenger Car Show	Jan. 8-15, 1921
Milwaukee	Annual Winter Show	Jan. 14-21, 1921
Schenectady, N. Y.	Annual Automobile Show	Jan. 16-22, 1921
Oklahoma City	Automobile Show	Jan. 17-22, 1921
San Francisco	Automotive Equipment Exposition	Jan. 22-27, 1921
Cleveland	Annual Automobile Show	Jan. 22-29, 1921
Montreal	Nat'l Motor Show of Eastern Canada	Jan. 22-29, 1921
Amsterdam, N. Y	Annual Automobile Show	Jan. 23-29, 1921
Lawrence, Mass.	First Annual Show	Jan. 24-29, 1921
Chicago	National Passenger Car Show	Jan. 29-Feb. 5, 1921
Hudson, N. Y.	Annual Automobile Show	Jan. 30-Feb. 5, 1921
Minneapolis	Winter Show	Feb. 5-12, 1921
Newberg, N. Y.	Annual Automobile Show	Feb. 6-12, 1921
Kansas City, Mo.	Annual Automobile Show	Feb. 12-19, 1921
Fitchburg, Mass.	Automobile Show	Feb. 12-19, 1921
Winnipeg	Western Canada Automotive Equipment Show	Feb. 14-19, 1921
Pittsfield, Mass.	Annual Automobile Show	Feb. 20-26, 1921
Louisville, Ky.	Automobile Show	Feb. 21, 1921
Deadwood, S. D.	Annual Automobile Show	Feb. 21-26, 1921
Wichita, Kan.	Annual Automobile Show	March 1-5, 1921
Des Moines	Open Car Show	March 2-5, 1921
Des Moines	Closed Car Show	March 7-10, 1921
Indianapolis	Automobile Show	March 7-12, 1921
Boston, Mass.	Annual Show	March 12-19, 1921
Torrington, Conn.	Annual Automobile Show	Mar. 20-26, 1921
Gloversville, N. Y.	Annual Automobile Show	Apr. 3-9, 1921

Tractor Shows

Columbus, Ohio	National Tractor Show	Feb. 6-12, 1921

Foreign Shows

Sydney, Australia	Automobile Show	Dec. 10
Delhi, India	Delhi Motor Car Show	Feb. 7, 1921

Conventions

Cincinnati	Ohio Automobile Trade Assn. Fourth Annual Convention	Dec. 8-10
Cedar Rapids, Iowa	Iowa Motor Trades Bureau	Dec. 8-9
Cincinnati	Annual Convention Ohio Automobile Jobbers' Assn.	Dec. 8-9
Columbia, S. C.	Annual Meeting South Carolina Automotive Trade Assn.	Dec. 9-10
Milwaukee	Wisconsin Automotive Dealers' Assn.	Jan. 19, 1921
Chicago	N. A. D. A. Annual Meeting	Jan. 31-Feb. 1, 1921
Chicago	Automotive Electric Service Association	Feb. 2-4, 1921

Races

Los Angeles	Thanksgiving Day Speedway Classic, Beverly Hills Speedway	Nov. 25, 1920

Half Way Across the United States

It's just as far either way when you get here—1733 miles to either ocean—and being this far you may as well go all the way

Business Notes

The Ames Carbureter Co. is the new style adopted by the Hexmen Motor Co. of Racine, Wis., which was established a year ago to manufacture a new type of auxiliary carbureting device for internal combustion engines. The company has developed carbureters as well as the auxiliary device.

George L. Hunt Manufacturing Co. of Boscobel, Wis., has been organized to manufacture automotive equipment, parts and accessories.

The Yates & Johnson Mfg. Co., Chippewa Falls, Wis., organized a year ago to engage in the foundry and machine shop business, has changed its corporate style to Northlite Manufacturing Co. and increased its capital stock from $25,000 to $100,000. It is erecting plant additions and will put in production besides gas engines a new design of electro-generating unit for isolated places.

The Eastman Mfg. Co., of Manitowoc, Wis., has increased its capital stock from $25,000 to $50,000 to finance expansion of its business, consisting of gas hose couplings and other brass specialties. It will install its own nickel plating and electro-galvanizing shop and enlarge the line of products as well.

The Oliver Manufacturing Co. of Chicago, one of the pioneer manufacturers of lifting jacks in this country, has been acquired by Milwaukee interests represented by Helmus B. Wells, for fourteen years secretary of the Northwestern Malleable Iron Co., Milwaukee. The Oliver Mfg. Co. of Milwaukee has been incorporated in Wisconsin to take over the business. The plant will be moved from Chicago to Milwaukee and enlarge its production to include wrenches, tools, etc. Mr. Wells takes the general management, although retaining an interest in the Northwestern foundry.

The Hub Body Corp. of Milwaukee is the name of a new concern organized to manufacture special speedster and sport type bodies for passenger cars. The promoters are A. B. Elmer and Herbert Zwebell, widely known in the automotive trade as manufacturers of retreading machines and other tire repair apparatus.

To develop a new liquid fuel for internal combustion engines of existing practice, the duPont Motors, Inc., of Ashland, Wis., has been incorporated by A. B. Fontaine, Ralph T. Osman and A. Sparling.

The White Co., Cleveland, has elected Homer H. Johnson, head of one of the best known law firms in the middle West, chairman of the board of directors to succeed the late M. B. Johnson, his law partner. The company continues to work a day and night shift in the manufacture of motor trucks.

At the initial meeting of creditors of the Famous Truck Co., Inc., of St. Joseph, Mich., it developed that the court had been unable to procure books or records showing the amount of stock sold or the names of stockholders. It is reported that between $100,000 and $200,000 worth of stock in the company was disposed of. Appraisal of the assets showed $22,788.80 against an indebtedness of $89,254. This latter, however, does not represent the loss to stockholders.

Dissolution of the Pontiac Body Co., is asked in a petition filed by George A. Brown, N. N. Parker and A. W. King, three of four directors. The action is for the purpose of winding up the company's affairs and disbursing $20,000 held in bank to the company's credit and $7,778.90 due from the General Motors Corp., which purchased the property of the body company last October. The company was organized in 1910 as the Monroe Body Co., and the name was changed in March 1919.

The United Automotive Body Co., of Springboro, Pa., has leased a building in Lansing, Mich., to be used as a body assembling plant for furnishing truck bodies to the Reo and Oldsmobile factories.

A. R. Johnson has been appointed assistant sales and advertising manager of the Auburn Automobile Co., Auburn, Ind.